A McGRAW-HILL PUBLICATION

Chemical Week

CW Report: Ethylene, next five years . . p. 79

Plastic film prospects are bright; new products, new uses boost sales . . . p. 40

New look in lab photography. How color films pay their way in research . . . . p. 59

Cool-running centrifugals vie for compressor jobs, offer power space savings. p. 106

Engineers enlist computers in new timesaving gambits. Three case studies . . p. 119

May 9, 1959

STEVENS RICE G
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Lasting lesson from the school of hard knocks

Cobblestones caused many a jolt before a Scotsman living in Belfast first put pneumatic tires on bicycle wheels. This smoothed the ride over rough roads, but the primitive rubber wouldn't hold up until a way was found to toughen it.

The discovery: tire life can be doubled by mixing carbon black into uncured rubber. But it wasn't easy to get semisolid gum rubber to absorb carbon black, and so a faster, cleaner way was found: carbon black was stirred into synthetic rubber in the *liquid* (latex) stage.

Today, Shell Chemical makes possible even more intimate absorption of carbon black with a *new, high-speed* mixing method. The result: a better, more convenient rubber for tire makers . . . tires wear longer than ever.

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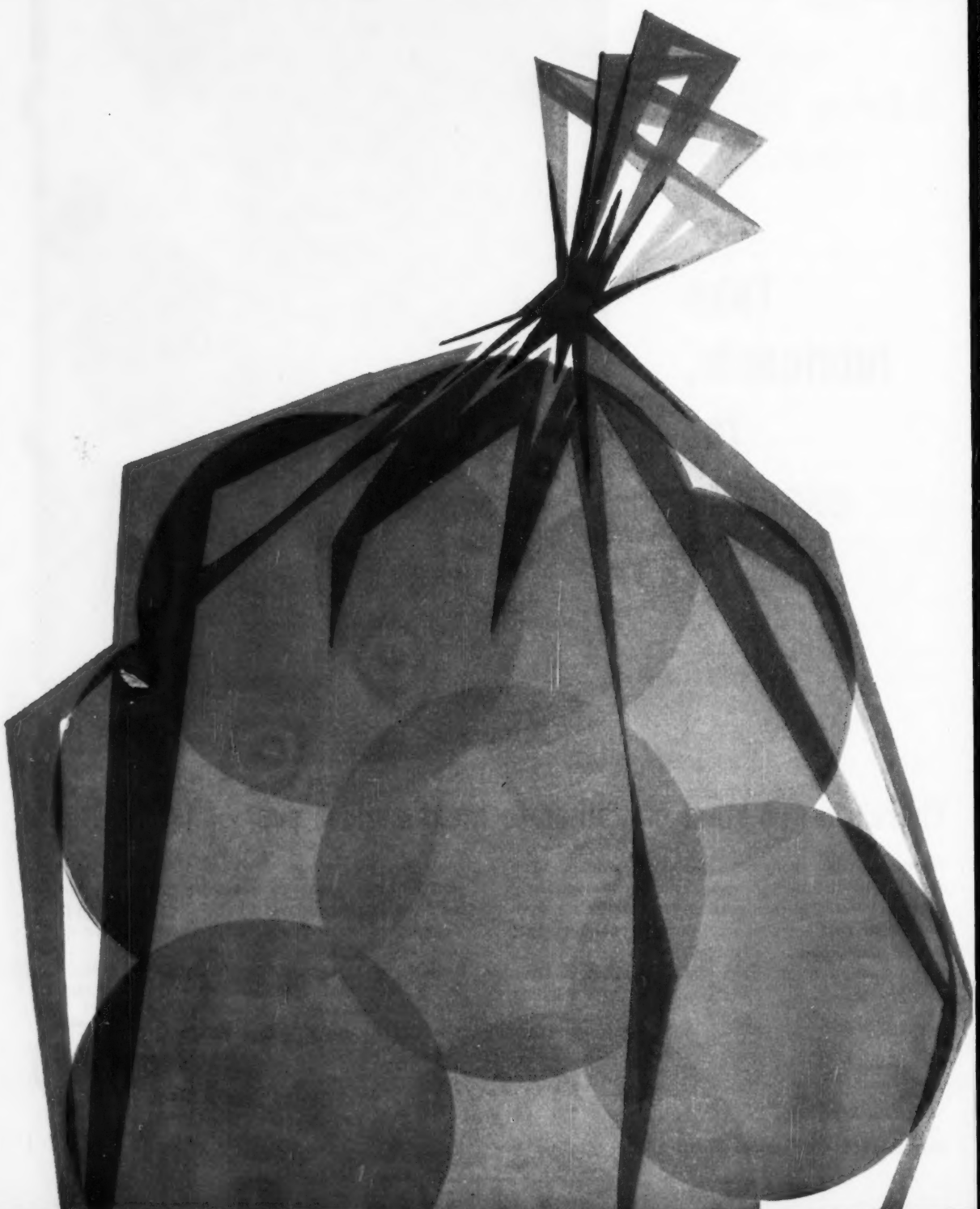

Chemical Week

TOP OF THE WEEK **MAY 9, 1959**

Benzene from Russia is one of first cargoes through Seaway which opened last week to ocean-going vessels .....**p. 42**

Chemical firms gain from International Student Exchange. Result: better international business relations .....**p. 67**

Naphthalene supply situation not yet good, but easing. But steel strike may upset generally improving balance .....**p. 95**

Chemical imports climb in '58. Industrial and coal-tar products lead the parade of chemicals from abroad .....**p. 133**

15 VIEWPOINT

15 OPINION

16 MEETINGS

37 BUSINESS NEWSLETTER

40 Resin and film makers expand—capitalize on packagers' shift to high-speed equipment that handles plastic films.

42 Russian benzene is among first chemical cargoes through St. Lawrence Seaway.

43 Equipment and instrument makers find sales and earnings on the upgrade—but their record can't match chemical producers'.

44 Two big petrochemical expositions feature chemical processes.

44 Spate of ethylene oxide plants coming onstream in Europe are latest phase of foreign petrochemical buildup.

47 WASHINGTON NEWSLETTER

51 SPECIALTIES
Household dye business is spurred by increasing emphasis on dyeing in automatic washers—'59 sales mark will be in $20-million range.

55 New survey of household laundry product preferences gives tips to specialties makers.

59 RESEARCH
Color photos prove their usefulness in research work.

63 U.S. and Soviet step up chemical warfare research, says Army chief.

67 ADMINISTRATION
By-product of international student exchange programs: better relations between U.S. and foreign businessmen.

70 First appointments under New York's strong atomic development act set stage for department's activities.

79 CHEMICAL WEEK REPORT
Ethylene, prime petrochemical, heads for five years of growth.

95 MARKETS
Naphthalene picture brightens—U.S. output increases. But imports are low, and U.S. production is threatened by potential steel strike.

98 Russia a potential zinc exporter? Not likely. Although production is up, consumption is higher.

103 TECHNOLOGY NEWSLETTER

106 PRODUCTION
New designs in centrifugal compressors cut horsepower requirements through improved cooling.

113 MARKET NEWSLETTER

119 ENGINEERING
Computers' role in chemical engineering? Three companies show how computers have helped them.

124 Biggest uranium mill goes onstream at Grants, N.M.

133 SALES
Imports climb—leaders are coal products, industrial chemicals.

146 BUSINESS BENCHMARKS

COVER: MICROPHOTOGRAPH OF POLYESTER FORMATION, COURTESY ALLIED CHEMICAL

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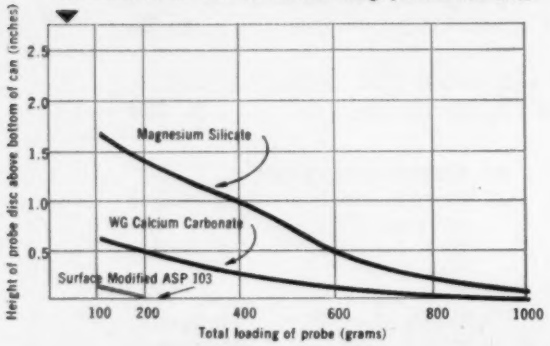
news briefs...

ON THE CREATIVE USE OF M&C PROCESS MATERIALS

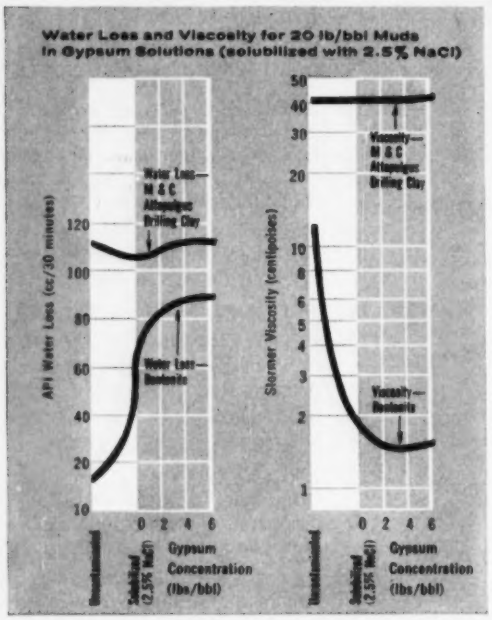
Results of Patton Pigment Settling Gauge tests on three formulations.‡ Each formulation was ground 5 hours and set on the shelf for 35 days. Then the settling characteristics were measured. Interpretation of results: the *higher* the reading, the *more* settling and the *harder* the body of settled pigment. In the ASP 103 formulation, the weighted probe went completely through the paint to the bottom of the can with minimum weight, in minimum time.



*Paint Makers: get fine grind quickly, superior suspension with Surface Modified ASP® extender pigments

Required fineness of grind in shortest time, long shelf life are assured for organic surface coating systems using M&C's Surface Modified ASP 103 . . . graphs present proof. Other benefits: stability, weatherability, color integrity—ASP's are water-washed to uniform particle size and shape, virtual chemical inertness. There's much more to the role of ASP's in surface coatings...this is a *starred* item...use the coupon.

Patton Pigment Settling Gauge measures settling characteristics of paints. A weighted probe passes down through paint in quart can, at half-minute intervals distance above bottom is read and load increased. Readings provide a profile of settled pigment. ▶



Oil Well Drillers: higher yields without costly treatment when using M & C's improved Attapulgus Drilling Clay

Gyp, salt, oil emulsion, and completion muds—M&C's Attapulgus Drilling Clay is lower-cost than bentonite in just about any drilling mud. Why? *Substantially higher yields, and continued stability in the presence of field contaminants* without requiring costly chemical treatment. Graph shows evidence of comparative performances in gyp solutions. Viscosity and water loss rate of the Attapulgus Drilling Clay suspension is practically unchanged, from initial make-up in fresh water throughout continued build-up of gypsum concentration. However, the bentonite suspension solution shows a steady loss in viscosity and increase of water loss rate. Get the rest of the story on M&C's improved Attapulgus Drilling Clay . . . check the coupon . . . it will bring you TI-552, a 12-page bulletin just off the press.

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7146 Essex Turnpike, Menlo Park, New Jersey

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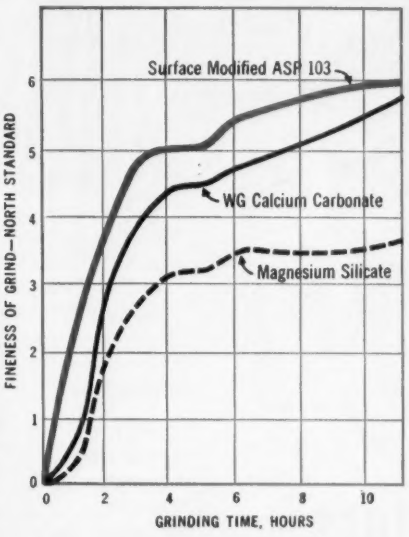
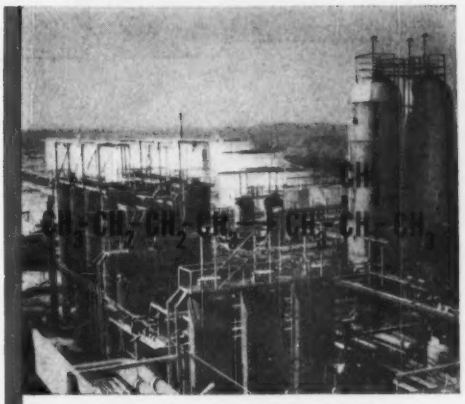
Export Department: Room 150, Garden State Parkway, Menlo Park, N. J. (Cable Address: "MICOR")

‡Grinding Formula

Iron Oxide, Brown... 150 grams
50% Alkyd Solution. 178 grams
Minerals Spirits..... 118 grams
ASP 103..... 170 grams
or Calcium Carbonate 178 grams
or Magnesium Silicate 188 grams
(equal volumes)

Comparison of rates for achieving fine grinds for three formulations.‡ Results with the ASP 103 formulation prove the case for achieving shorter grinding times, lower costs.

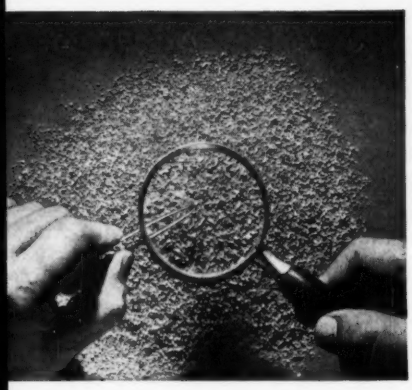




Isomerization—Porocel serves refiners' increasing needs for iso-butane

Alkylation demands more and more iso-butane. Isomerization of normal butane to iso-butane is supplying the needs—catalyzed by Porocel-supported aluminum chloride under proven processes. Easy-to-impregnate, economical Porocel brings to refiners other advantages: top hardness, high activity, uniform impregnation, inertness, long life. Check the coupon for data on Porocel natural bauxite, the highly active catalyst and catalyst carrier.

*Looking for surface area? Granular Attapulgus Clay warrants close inspection



"Selective thirsty-blotter action" describes the way M&C's Granular Attapulgus Clay works. This results from the unusual combination of characteristics given by nature to its source material, the mineral *attapulgite*. The ultimate particles are lath-shaped with diameters of 10 to 50 millimicrons. Processing and thermal activation produce Granular grades with a surface area of 125 m^2/gram in a minutely-porous crystalline structure . . . completely inorganic and essentially inert.

In processing: With its high surface area Attapulgus Clay's adsorptive capacities are outstanding. Commercial treating yields vary from 70-250 barrels per ton of clay in lube oil percolation to 6,000-20,000 barrels per ton in dearsenification of heavy naphtha feeds to platinum reforming. Attapulgus Clay is *regenerable*—an important factor when economic conditions warrant repeated usage.

As a raw material: Attapulgus Clay's high sorptive capacity makes it a valuable ingredient in many products, such as insecticides and herbicides. Dry, free-flowing products containing as much as 25% liquid ingredients can be obtained.

There are many product and processing problems waiting to be solved by Granular Attapulgus Clay . . . investigate it for *yours*. This item is starred . . . send the coupon.

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✓ your product interest . . .
✓ what you need to get tests started . . .
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For more data, see your 1959 Chemical Materials Catalog, Pages 192-196

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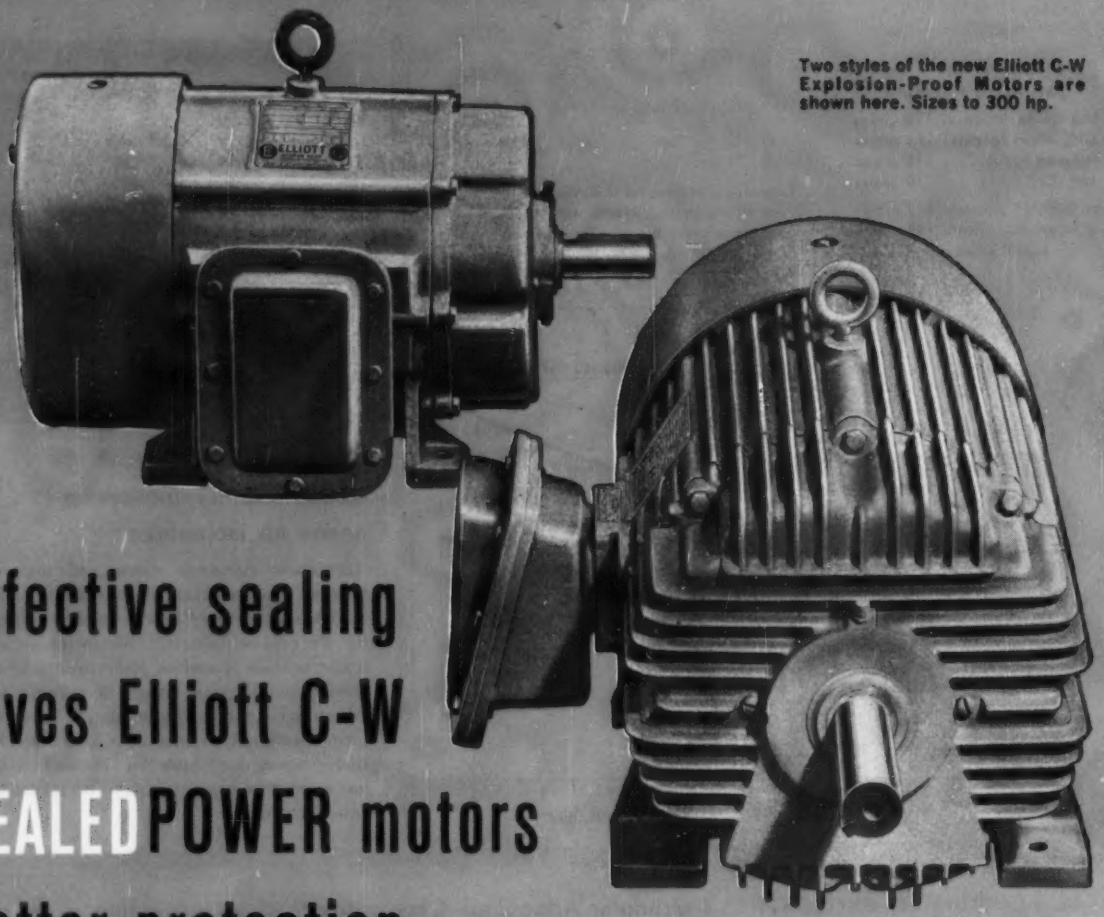
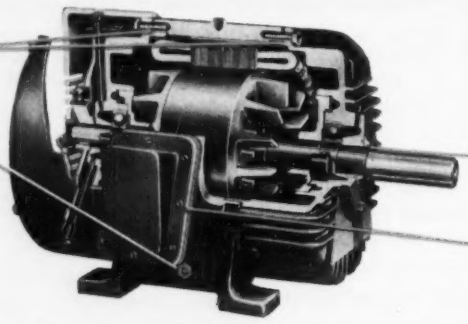


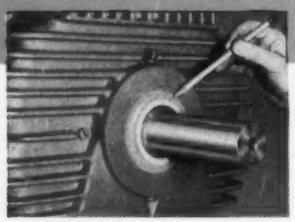
Two styles of the new Elliott C-W Explosion-Proof Motors are shown here. Sizes to 300 hp.

effective sealing gives Elliott C-W SEALEDPOWER motors better protection against moisture, dust, fumes, corrosion

LONG, SNUG BRACKET SEAL. Close-fitting, deep rabbet provides explosion-proof type seal for all SEALEDPOWER motors.

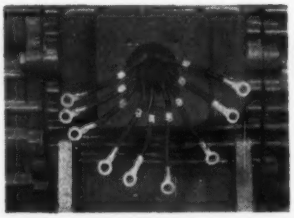
EASILY ACCESSIBLE, automatic breather and drain plug, underwriters approved, for removing internal moisture accumulations.





ROTATING SLINGER PREVENTS entrance of dirt and moisture through the bearing and shaft opening.

NO LEAKAGE HERE. Tightly sealed leads and opening. Metal-to-metal fit between conduit box, frame and cover.



NEW DATA on the complete line of Elliott C-W SEALEDPOWER motors is given in Elliott Bulletin PB 6000-2. Send for free copy today.

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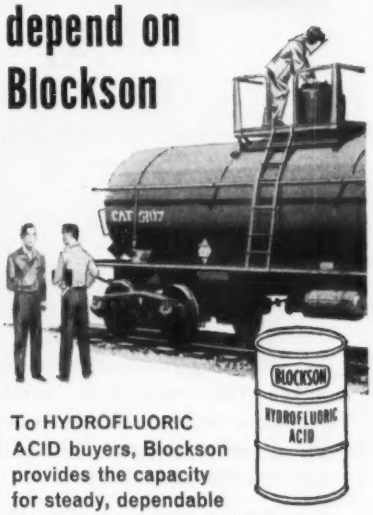

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DOW

Chemical news . . .
no more cry for supply

In the past decade, ups and downs in price made life interesting, but hectic, for glycerine buyers. Came the revolutionary development of synthetic glycerine in production quantities, and glycerine-using industries breathed more freely. This report to chemists and chemical engineers is designed to give a clear picture of glycerine's status in terms of availability and price, and to discuss briefly a few of Dow's other industrial chemicals . . .

You may wish to check certain items in this advertisement and forward to those concerned in your company.

ROUTE TO:

_____

_____

_____

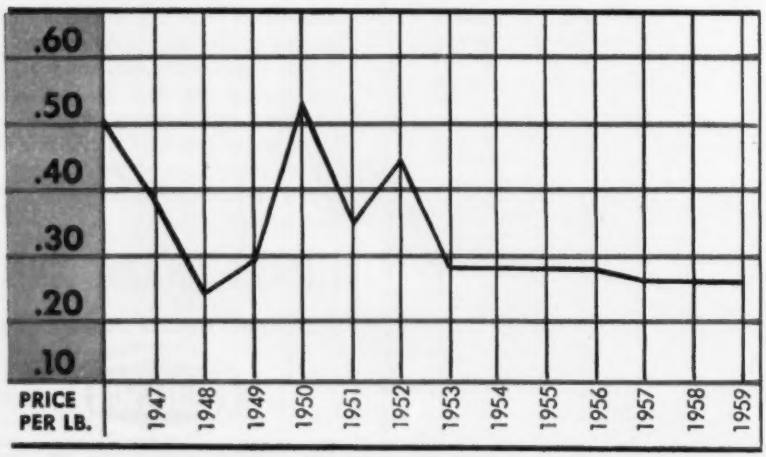
_____

GLYCERINE . . . PLENTY ON HAND AT ATTRACTIVE PRICES

The development of synthetic glycerine over ten years ago provided industry with twin benefits . . . a source of supply which did not depend wholly upon the production of soap and fatty acids, and improved, consistent quality. The high production capacity of Dow's two glycerine plants now makes the man-made product available to any manufacturer in any quantity desired, at a relatively stable price level.

Dow's big Freeport, Texas, synthetic glycerine plant went on stream in 1955. Even before the plant was in production, news of its high capacity had the effect of reducing glycerine's price. At the same time, it assured industry of a dependable source of glycerine supply in any quantity, on short notice. Since that time glycerine has never been in short supply nor is it at present! This fact is attested to by today's price, which has had little or no fluctuation over the past five years.

Price of a product is determined by availability, and here Dow product economy again provides benefits. Dow is "BASIC"—*produces all of the raw materials from which it synthesizes glycerine.* Since the production and supply to industry of Dow synthetic glycerine began, price of this commodity has gone to an unprecedented low and remained there. Dow is able to produce and deliver glycerine in quantities required for industry's needs thereby eliminating short supply situations.



Price Statistics: Glycerine Statistics, L. Pasternak Company, 1947-1951; Journal of Commerce, 1952-1959

The accompanying graph tells an interesting story of what happened when Dow started production of glycerine. Prior to the introduction of the synthetic product, the main commercial source for glycerine was the soap industry, from which natural glycerine was obtained as a side product. Naturally, as in the case of any by-product, the supply of glycerine varied with soap production. And of course, price varied, too—but inversely.

Other complicating factors that historically have influenced glycerine supply and price: (1) the inroads that detergents have made on total soap production. Less soap—*ergo*, less glycerine by-product. And (2) during the war years, the commandeering of glycerine to make munitions.

The drop in price late in 1953 coincided with Dow's announcement to industry of finalized plans to construct the Freeport plant. Since that time, regardless of the country's glycerine inventory, there has been no price increase. From early in 1954 until late

1956 glycerine, U.S.P. remained steady at 29¢. It then dipped to 27¢. A further drop of ¼ cent per pound occurred last year. Now industry is free to make extensive long-range plans concerning processes and products requiring glycerine. You buy it, Dow will deliver it. Drums, tank cars or shiploads . . . Dow glycerine is here to stay, at a stable price.

CAUSTIC SODA—

coming at you 14 ways

Early this year, when construction was completed on a distribution terminal in St. Louis, Missouri, the number of caustic soda terminals maintained by Dow across the country came to nine.

Last October, a multimillion dollar plant for 50% and 73% caustic soda went into production at Plaquemine, Louisiana, ten miles south of Baton Rouge. With plants in Michigan, Texas, California and Ontario, Dow now has a total of five production plants.

All together, this brings to fourteen the number of shipping points operated by Dow, coast to coast, for caustic soda, bulk or dry, delivered by barges, tank cars and trucks. Behind this distribution service is a technical service that's second to none in solving problems for manufacturers in every industry.

★ ★ ★ ★

WE HAVE ROOM here for only a few notes on but a small percentage of all the chemicals we supply. For information in depth on any chemical, we invite you to write THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemicals Merchandising Department 912AM5-9.

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THE DOW CHEMICAL COMPANY
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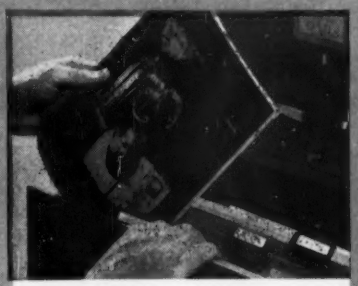
CHLOROTHENE . . . cost cutter for aerosols

Lowering of unit costs is the goal of all manufacturers. One path to this goal in aerosol products is the use of a versatile Dow solvent, Chlorothene®, (1,1,1-trichloroethane, inhibited).

Lower cost is but one advantage. Others include excellent solvency for active ingredients, reduced container corrosion in certain formulations, and the elimination of the need for odorous and highly flammable solvents. Additional information on Chlorothene, its uses, properties, costs and past performances is immediately available.

4 NEWS NOTES on other chemicals . . .



DEVELOPMENTAL CHEMICALS

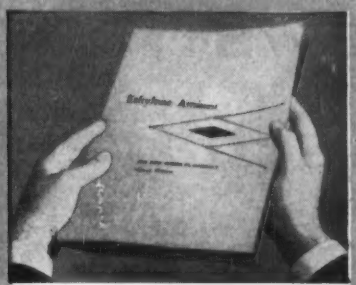
Research chemicals currently available in limited quantities from Dow are listed by name, structural formula, description, property data and size of sample in a new 56-page booklet entitled "Research Chemicals from Dow".

ALKANOLAMINES

If you are interested in discussing emulsion formulation in such fields as pharmaceuticals, cosmetics, agriculture, and home use wax and polish products, Dow technical service and development men can help you.

DOWANOL

Dow offers the only line of glycol ether solvents including both an ethylene and propylene series of products trademarked Dowanol®. Their broad use as chemical intermediates and their versatility as solvents make them very popular.



ETHYLENE AMINES

A new technical treatise, recently made available to chemists and engineers, discusses Dow's ethylene amines—ethylenediamine, diethylenetriamine, triethylenetetramine and tetraethylenepentamine. Send for the book.

this

one

machine

a-u-t-o-m-a

positions...

fills...

weighs...

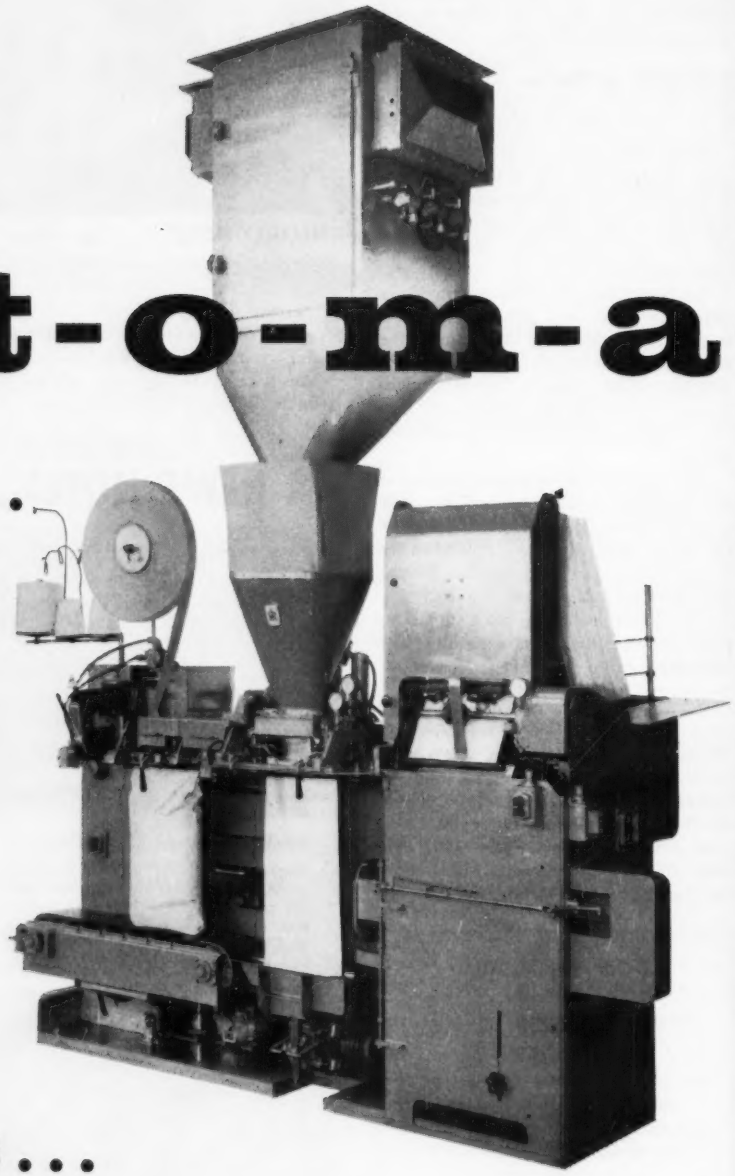
settles...

closes...

sews...

discharges...

open-mouth multiwall bags!

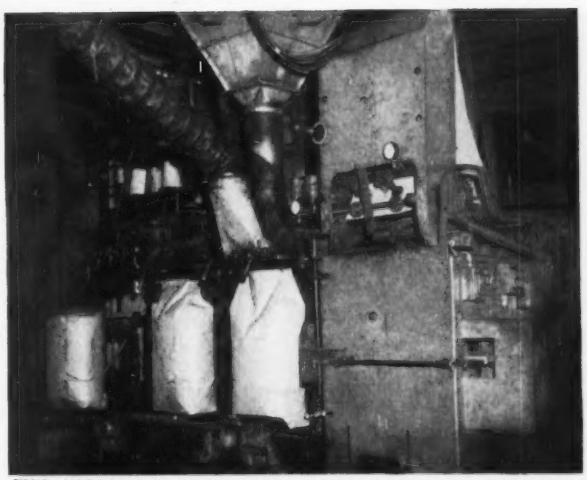


t-i-c-a-l-l-y

Here's the one machine that performs every sewn open-mouth bag packing operation automatically! It's the all-new St. Regis Vredomatic!®

Fully proven by extensive field testing, the St. Regis Vredomatic offers you many amazing advantages. For example, the Vredomatic requires only *one part-time attendant* even when boundover tape is being used.

If you pack free-flowing or semi-free-flowing chemicals in open-mouth multiwall bags, it will pay you to investigate fully the many unique advantages offered by the St. Regis Vredomatic. For details, write Multiwall Packaging Division, St. Regis Paper Company, Dept. CW559, 150 East 42nd Street, New York 17, New York.



THIS VREDOMATIC, installed in a carbon black plant, automatically packs approximately 10 bags of carbon black per minute with 'on the head' weight accuracy.

MULTIWALL PACKAGING DIVISION

St.Regis PAPER COMPANY

IN CHEMICAL PACKAGING, ST. REGIS MEANS LOWER COST PER TON!

Rain with a view

One of the more appealing aspects of the progress of plastics is the transparent vinyl raincoat. Rain or shine, you see color and beauty everywhere.

The credit is largely due to a group of phosphorus chemicals called trialkyl phosphites. Use of any one of these compounds in a vinyl stabilizer helps retard haze formation so that the finished vinyl product comes out crystal clear. In addition, these phosphites impart heat and light stability to vinyl.

Trialkyl phosphites, one of the five big groups of V-C organic phosphorus compounds, are also seeing wide service in industry as chemical intermediates. A partial list of uses includes: oil and grease additives, flameproofing compositions, specialty solvents, and antioxidants. It may be that a V-C phosphite can contribute something to *your* product or process. Why not investigate?

With V-C phosphites, as with all V-C phosphorus chemicals, you're sure of getting top quality and purity. The reason is V-C's integrated operational control—from mining its own phosphate rock . . . on through production to non-contaminated delivery in its own trucks. For information on the complete line of V-C chemicals, see your V-C distributor, or contact:

Virginia-Carolina Chemical Corporation • Chemicals Division
401 East Main Street, Richmond 8, Virginia • Phone: Milton 8-0113

FOR PROFITS AND PROGRESS... SEE V-C®

MEISSNER and GIRDLER collaborate to bring you better processes

Girdler Construction Division has arranged to be the North American agents for the firm of J. Meissner, Cologne, Germany, and has acquired the rights to act as engineers and constructors for Meissner continuous process plants. Girdler will translate the Meissner designs into American standards and codes.

Meissner processes are used throughout the free world for all phases of explosives and for many raw materials used in chemical products. A few are listed here. Present Girdler processes supply intermediate materials for many of these Meissner processes, hence, a natural tie-up.

May we tell you more about this and relate it to *your* products? GIRDLER CONSTRUCTION DIVISION, CHEMETRON CORPORATION, Louisville 1, Kentucky • New York • San Francisco.

Meissner Processes

Hexamine
Pentaerythritol
Nitrobenzene, mono- and di-
Nitrochlorobenzene, mono- and di-
Nitrotoluene, mono-, di- and tri-
Nitroglycerine
Nitroglycols
Nitrocellulose
Explosives

Girdler Processes

Acetylene
Ammonia
Ammonium Nitrate
Carbon Dioxide
Formaldehyde
Gas Purification
Hydrogen
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Sulfide
Nitric Acid
Phosgene
Sulfur

Complete list of processes available upon request.

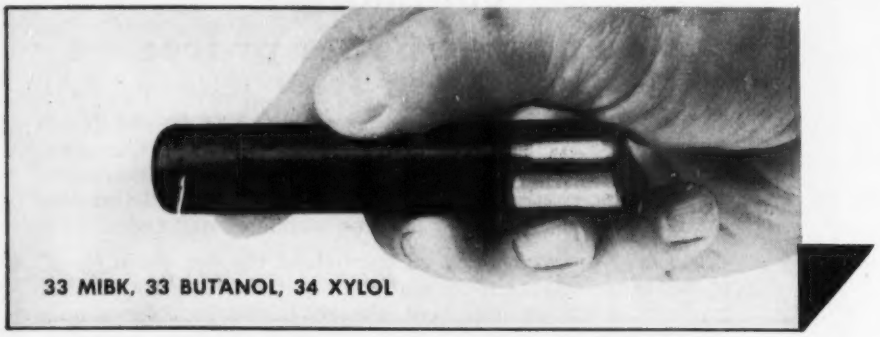
GIRDLER

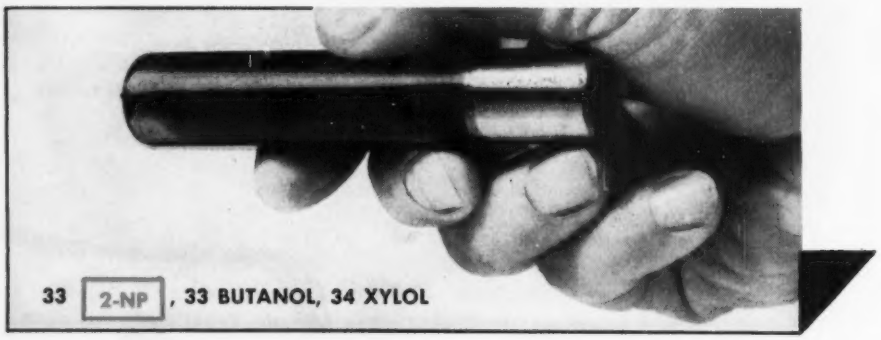
chemical processes and process plants

CHEMETRON

GIRDLER KNOWS where to secure licensed processes—**GIRDLER KNOWS** how to translate process and plant designs into American standards and code requirements—**GIRDLER KNOWS** how to apply the process to your needs and to build and equip the plant.

For Extra Protection
in Epoxy Coatings





2-Nitropropane
makes the difference

With 2-NP, you get

- **Greater Chemical Resistance**
- **Uniform Evaporation Rate**
- **Minimum Pinholing and Cratering**
- **Thicker Films**

Greater Chemical Resistance. In the test illustrated here, ¾-inch steel bars were given a resin coating 6 to 8 mils thick. They were dried one week, and then exposed to 30% Nitric Acid. The unretouched photographs are striking evidence of the improvement contributed by 2-NP.

Uniform Evaporation Rate. The evaporation rate of 2-Nitropropane is ideal for spray systems, contributing favorable flow properties and excellent blush resistance with improved drying times.

Other Advantages. Films using 2-Nitropropane show marked reduction of water vapor permeability, excellent spray characteristics, and less tendency to crawl. Also, substantially thicker films can be obtained at no loss of other desirable features. 2-NP can be used to advantage in both polyamide or amine catalyzed systems, and systems employing urea-formaldehyde or phenolic cross-linking agents.

Write for Technical Data Sheet No. 23C.

INDUSTRIAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION

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On the Record

TO THE EDITOR: . . . I wish to advise you that I inserted into the Congressional Record on April 15 the "Viewpoint" from CHEMICAL WEEK on retail price maintenance. . . .

JOHN D. DINGELL
Member of Congress
Washington, D. C.

Dunn's Review

TO THE EDITOR: I read with a great deal of interest your excellent article on uranium dioxide (*CW, March 28, p. 30*). Upon checking the forecasts presented in this article with a market study I made several months ago, I found an amazing high order of agreement. This is most reassuring to me since it is the first time I can remember another 10-year forecast checking with mine to three significant figures for all 10 years. . . .

WILLIAM W. DUNN
Industrial Market Research
Spencer Chemical Co.
Kansas City, Mo.

The figures were indeed those prepared by Mr. Dunn in a report which Spencer released to CW. *Others in the industry felt the figures constituted a good, detailed forecast, so they were run as is—but, regrettably, without credit.*—ED.

TO THE EDITOR: [Re] your uranium oxide report (*CW, March 28, p. 30*), this information is very appropriate.

The emphasis on uranium dioxide with a slight degree of enrichment as the coming nuclear fuel is clearly brought out and properly identified. Such a discussion for your readers should be enlightening, since the general concept had been that uranium metal was the main fuel. To the specialists and reactor designers in this field the advent of uranium dioxide had taken place some time ago.

The probable market you visualize is as realistic as could be expected, although it may be on the conservative side; for instance, you may recall the survey Pickard-Warren-Lowe Associates made last year for the Atomic Industrial Forum. Fred Warren's estimate concerning the foreign atomic energy market for uranium concentrates was that during the period 1963-67 the market would be between 90 million and 147 million lbs.; and U.S. producers might expect to secure 25-33% of this market. I realize that when we try to project the demand of foreign reactors and fuel requirements other than those built in the U.S., we are on very nebulous territory.

In your table on page 32, it is not quite clear whether the stated estimated amounts are on an annual fiscal-year basis or cumulative. In other words, can we expect to sell 1.7 million lbs. of uranium dioxide in '68 and an additional 1.9 million lbs. in '69? [*The figures are annual.*—ED.]

I was glad to see you bring out the blending possibilities Jesse Johnson is trying to develop. Some day we will have to determine the relative economics of this method of securing enriched material, compared with initial extraction from gaseous diffusion.

J. H. HAYNER
Nuclear Engineer
The Anaconda Co.
New York

Two-Way Seaway

TO THE EDITOR: I found your article on the St. Lawrence Seaway (*CW, April 11, p. 21*) very interesting and have no doubt that some of the things mentioned eventually may come to pass. However, as clearly indicated throughout the article, everyone is moving with a certain amount of caution during the first year of Seaway operation.

I believe few people realize that the St. Lawrence Seaway will be a two-way street, and that—while it may provide cheaper transportation to producers in this country who desire to market their products in foreign countries, and while it may even be somewhat economical for them in the movement of their inbound raw materials—it will also provide cheap transportation for goods produced in foreign lands. This, when we consider the lower labor costs in foreign countries, may, and very likely will, permit such commodities to undersell like articles produced in the United States at much higher costs. To the extent this may occur, it can be very harmful to our economy.

For example, during the year 1958,

VIEWPOINT

WE ARE SORRY that the inevitable has occurred. When President Eisenhower overruled the Tariff Commission's recommendation for higher duties on imports of tartaric acid, cream of tartar and tartrates, it was obvious that the last remaining domestic producer would have to make its temporary plant closing permanent. It has—and instead is distributing imported materials.

We are sorry about the shutdown, for two reasons. First, it shows that there are some cases where American industry is unable to gear its higher productivity and its mechanical skills to turning out products at a price that can compete with imported goods. Second, we are reluctant to see the users of any chemical become wholly dependent on foreign sources *(see also p. 133)***.**

But now that domestic production has been ended, let's look back at the entire procedure. The U.S. maker, Stauffer, had been selling at prices on which it lost money—and still it couldn't meet competition; it petitioned the Tariff Commission for increases in duty to enable it to compete; the commission made such recommendations. The recommendations went to the White House, which referred the matter to a seven-member interdepartmental committee. The committee voted five to one against the increases, the State Dept. reserving the right to report directly to the White House. President Eisenhower, agreeing with the vote, turned down the increase.

Coincidentally, the White House issued another import decision. It told the domestic oil industry that if it would not raise its crude oil prices, the government would agree to mandatory limitations on crude oil imports.

To be consistent with this, the White House should keep an eye on tartar chemical prices. We're betting that European producers, within six months or so, will have increased prices by an amount about equal to the proposed tariff increases.

Editor-in-Chief

this country imported approximately 2 million tons of manufactured iron and steel articles, including the equivalent of 20,000 carloads of barbed wire.

I have been informed that one particular movement of 25,000 tons of pipe was imported and delivered at a destination within 200 miles of one of our large pipe mills at a cost of $50 less per ton than the prevailing domestic price. During the same year, we exported less than one-half of the amount of iron and steel we exported during the previous year.

When we consider that it requires several tons of such commodities as iron ore, coal, scrap iron and stone to produce one ton of iron and steel, it becomes clear that the 2 million tons of iron and steel imported into this country during '58 displaced about 5 or 6 million tons of other materials so far as transportation was concerned; and to the extent the coal was not needed to produce that steel, coal was not mined and miners were out of work. Thus, you can see the far-reaching effect the Seaway may have upon the economy of the central part of this country, because it will enable the importation of even a greater volume of traffic at even lower transportation costs.

E. V. HILL
Chairman
Traffic Executive Assn.
Eastern Railroads
New York, N. Y.

'No Drum Shortage'

TO THE EDITOR: We noted with considerable interest an article "Reconditioners Gird for Drum Shortage" *(CW, March 21, p. 56)*. There are two comments that we would like to make on this.

You report that "tight-head drums cannot now be effectively coated because of their small openings, ventilation problems."

Our company, after exhaustive and intensive research and application, evolved a method of coating a bung-type drum to perfection. Our "Rebuilt" drum has been welcomed by the chemical, petroleum, edibles industry, etc., and is enjoying wide usage. . . .

Your article also reports that some reconditioners are "supplying customers on a priority basis, and a few have been forced to reject big 25,000-50,000-drum orders."

As leading reconditioners in the steel drum industry for many years, we believe that we would know of any such existing inquiry and would in all probability have been called upon for at least a portion of this requirement; however, this has not been the case. . . . Our company is well prepared to handle requirements not only for 50,000—but for 100,000 drums. . . .

MAURICE R. BINDER
Binder Cooperage Co.
Philadelphia

Chlorine Predictions

TO THE EDITOR: The article on chlorine outlook *(CW, March 7, p. 113)* prompted a comparison of actual production with Ewell and Scheuerman's 1952 long-range forecast based on use of the Gompertz curve.

Their forecasts were remarkably accurate for the 1952-57 period, in spite of the fact that Gompertz projections are most useful for indicating long-range trends.

Year	*Forecast*	*Actual*
	(million tons)	
1952	2.4	2.6
1953	2.7	2.8
1954	2.9	2.9
1955	3.2	3.4
1956	3.5	3.8
1957	3.8	3.9
1958	4.2	3.6 (est.)

Their Gompertz projection for chlorine production in '69 was 10 million tons. This may seem impossible, but deserves serious consideration, I think. The '42 situation was very similar. In '41, production was 0.8 million tons, and the Gompertz projection of 2.5 million tons for '51 seemed equally unattainable to most people in the industry. Yet it was achieved.

It seems to me that the difficulty in accepting purely statistical projections of this sort is the result of a human tendency to place too great a value on personal appraisal of end-use potentials, and to overlook the inability to accurately anticipate new markets.

All of us who are interested in market research and forecasting might well consider making greater use of Gompertz, or other mathematical, projections of chemicals serving diffuse markets and restrict our forecasts based solely on detailed studies of end-uses to those products with more limited outlets.

JOHN R. HORSEY
Manager
Market Research & Development
Darworth Inc.
Simsbury, Conn.

Sohio's Acrylonitrile

TO THE EDITOR: In your April 18 issue, the *CW* Report, "Vertical Integration: No Sure Ladder to Profit," contains the statement on page 93 that "Standard Oil of Ohio and Atlas Powder formed Solar Nitrogen to produce agricultural chemicals and acrylonitrile."

I would like to point out that the operations of the jointly owned Solar Nitrogen Chemicals, Inc., are limited to ammonia, urea, nitric acid and fertilizer solutions and have no connection at all with the acrylonitrile plant. This plant is being erected by Sohio and will be operated by Sohio Chemical Co.

We would appreciate your publishing a correction, since these two developments seem to be intermingled in the minds of many people.

E. W. SANN, JR.
Sohio Chemical Co.
Lima, O.

MEETINGS

Industrial Security Institute, third annual industrial mutual diasaster-control conference, Baton Rouge, La., May 10-12.

Flavoring Extract Manufacturers' Assn., 50th annual meeting, Roosevelt Hotel, New York, May 10-13.

Symposium on industrial uses of radioisotopes, Georgia Institute of Technology, Atlanta, May 11-12.

American Institute of Chemical Engineers, 40th national meeting, Muehlebach Hotel, Kansas City, Mo., May 17-20.

Chemical Specialties Manufacturers Assn., 45th midyear meeting, Drake Hotel, Chicago, May 18-20.

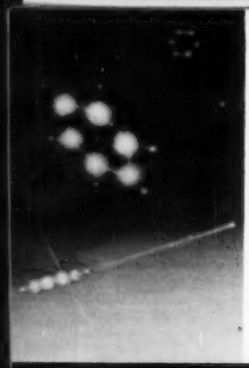
Chemical Market Research Assn., annual meeting; forecast of what's ahead in plastics, petrochemicals, nitrogen, surfactants, industrial gases, pharmaceuticals, boron compounds, pesticides and dibasic acids; Plaza Hotel, New York, May 20-21.

The last word in coal-tar derivatives

PORTRAYING THE INVISIBLE

Man has learned much about the molecule and the atom, but he has never seen them. Not even with the most powerful electron microscope. The benzene ring, for example, is customarily represented in the development of new chemicals by a diagrammatic symbol (right). Here, artist John Gaydos reaches out beyond the microscope's grasp to create an interpretation of the benzene ring. We see it as a tiny galaxy in the relative vastness of its surrounding cosmos.

PLASTICS AND COAL CHEMICALS DIVISION OF ALLIED CHEMICAL CORPORATION

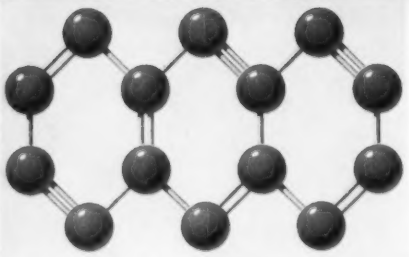


Long established as a major branch of the chemical complex, coal tar derived chemicals continue to offer attractive opportunities to development chemists and process engineers alike. Some of the chemicals described on these pages are commercially new—and

ELASTEX® PLASTICIZERS

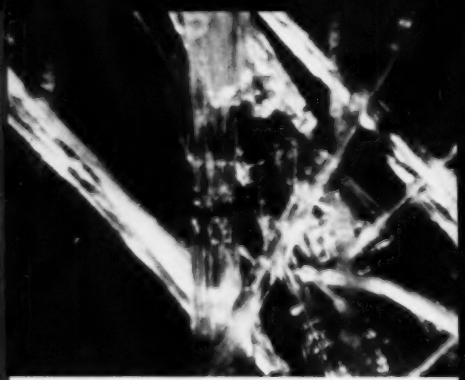
Plastics and Coal Chemicals Division can control the quality of "ELASTEX" Plasticizers, because they are manufactured from Allied Chemical's basic materials. Plasticizers which are liquid in form can be shipped to you by express tank truck from any of 12 key cities.

Dimethyl Phthalate*
Dibutyl Phthalate*
"ELASTEX" DCHP Plasticizer—Dicyclohexyl Phthalate
"ELASTEX" 10-P Plasticizer*—(Diisooctyl Phthalate) (DIOP)
"ELASTEX" 28-P Plasticizer*—Di-2-Ethylhexyl Phthalate (DOP)
"ELASTEX" 18-P Plasticizer*—Isooctyl Isodecyl Phthalate
"ELASTEX" 20-A Plasticizer*—Diisodecyl Adipate
"ELASTEX" 40-P Plasticizer*—Butyl Isodecyl Phthalate
"ELASTEX" 48-P Plasticizer*—Butyl Octyl Phthalate
"ELASTEX" 50-B Plasticizer*—Butyl Cyclohexyl Phthalate
"ELASTEX" 60-A Plasticizer*—Di-2-Ethylhexyl Adipate
"ELASTEX" 82-P Plasticizer*—Normal Octyl-Normal Decyl Phthalate
"ELASTEX" 90-P Plasticizer*—Diisodecyl Phthalate (DIDP)
"ELASTEX" 36-R Plasticizer—Medium molecular weight polymeric plasticizer
"ELASTEX" 37-R Plasticizer—High molecular weight polymeric plasticizer
Plasticizer 136*—An aryl alkyl hydrocarbon
* Available in Tank Cars and Trucks



ANTHRACENE

A well-known coal-tar constituent, anthracene is now available commercially from a domestic source. It has already found application as an intermediate in the manufacture of anthraquinone dyes. It undergoes both the Diels Alder and Friedel-Crafts reactions . . . can be reduced, nitrated, sulfonated and reacted with halogens . . . has remarkable photosensitive properties. Anthracene may prove an attractive starting point for materials now being produced by other methods. And it may open commercial possibilities for derivatives of yet undetermined potential.



ALLIED CHEMICAL PHTHALIC ANHYDRIDE

This crystal, magnified 100 times, is phthalic anhydride—starting material for alkyd resins, plasticizers, polyesters and a host of chemicals and pharmaceuticals. As the largest producer of phthalic anhydride, Plastics and Coal Chemicals Division has pioneered in development and standardization. A new standard of purity for Allied Chemical Phthalic Anhydride was recently announced, establishing its purity at 99.7 mole per cent minimum.

ACETOPHENONE

($C_6H_5COCH_3$)

A valuable intermediate, acetophenone is used in the manufacture of drugs, resins, dyestuffs and inks. It is also an effective extraction and process solvent. Its structure, related to many commercially valuable organics, suggests an excellent potential in synthesis applications.

ETHYL-BENZENE

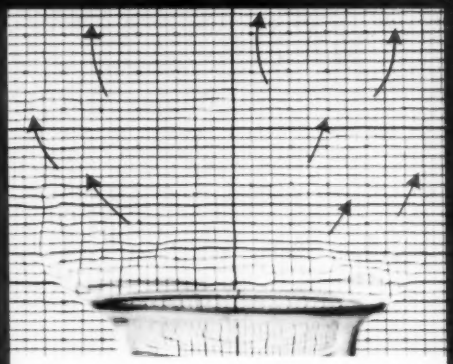
($C_6H_5CH_2CH_3$)

Though its principal use is the manufacture of styrene monomer, ethylbenzene is finding growing applications as an intermediate in organic synthesis and the production of synthetic dyestuffs. It is also a solvent for synthetic resins and a diluent for lacquers. It can be used as a heat-transfer medium and as a dielectric.

PLASTICS AND COAL CHEMICALS DIVISION

you may be the first to exploit them. Others are recognized staples of chemical processing, included here to acquaint you with the growing line of the world's largest producer of coal-tar chemicals ... Plastics and Coal Chemicals Division of Allied Chemical.

ALLIED CHEMICAL INDUSTRIAL AROMATIC SOLVENTS



Plastics and Coal Chemicals Division has led the way in establishing standard testing methods and specifications for light oil distillates. This work has paid off in the higher reliability of Allied Chemical Aromatic Solvents.

Benzol, Nitration
Benzol, Industrial Pure
Benzol, Industrial, 90%
Benzene, Thiophene-free
Toluol, Nitration
Toluol, Industrial Pure
Xylol, Nitration
Xylol, Ten Degree
Xylol, Industrial
Hi-Flash Solvent
1320 Oil
Wire Enamel Solvent

All available in Tank Cars and Tank Trucks

ALLIED CHEMICAL TAR BASES

This special class of refined coal chemicals includes pyridine, quinoline and related compounds. Recent developments indicate that their potentials in the field of industrial chemistry are just beginning to be realized.

Refined Pyridine 2A
Pyridine 10A
Pyridine 15A
Mixed Picolines 20A
Pyridine 30A
Mixed Lutidines
Tar Bases 50A
Refined Alpha Picoline 2A
Refined Beta Gamma Picoline
Refined Quinoline
Refined 2, 4 Lutidine
Special Refined Grades
Special Fractions

ALLIED CHEMICAL TAR ACIDS AND TAR ACID OILS

The phenols obtained from coal-tar distillates comprise a valuable group of manufacturing chemicals—the tar acids. Among them, you are likely to find acids to the exact degree of refinement you require. Tar Acid Oils are blends of tar acids and coal-tar neutral oils, selected to give varying phenol coefficiency and ready emulsifiability.

Phenols
Phenol USP, Synthetic
Technical Phenol (all grades)
Phenol-Cresol Mixes
Phenol-Cresylic Mixes

Cresols
Cresol, USP
Ortho Cresol (ranging from 50% to 98+% purity)
Metaparacresols
Resin Cresols
Special Cresol Fractions blended to order

Cresylic Acids
Mixtures of close-cut fractions blended to meet particular commercial requirements
Special Engine Cleaning Grades

Xylenols
Metaxylenol—45°C., 56°C and 61.2°C. Min. M.P.
Crude and Refined Grades
Special Fractions

Tar Acid Oils
Percentage of Tar Acids ranging from 10 to 50.

PHTHALONITRILE

Above is a diagram of the phthalocyanine molecule, formed by a ring of four phthalonitrile molecules around a central atom of copper or some other metal. Starting with phthalonitrile, you can produce phthalocyanine dyes or a host of other new compounds deserving investigation. Since phthalonitrile is now available, developments involving it can be put to immediately profitable use.

ALLIED CHEMICAL CORPORATION

Get the last word in coal-tar derivatives

For the convenience of purchasing people in specific chemical industries, we have compiled helpful product data on an industry-by-industry basis. You can have this data by filling out the coupon below, telling us what industry you're working in. You'll find it an important assist in keeping all our resources at your fingertips.

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.
In Canada: Allied Chemical Canada, Ltd., 1450 City Councillors St., Montreal

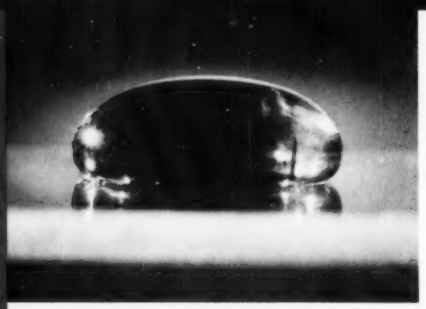
Allied Chemical

ALLIED CHEMICAL NAPHTHALENE

Comes in six convenient forms: ball, flake, ring, chipped, crushed and liquid. Suits requirements for insecticides, tanning agents, dyestuff intermediates, pharmaceuticals, phthalic anhydride and other industrial chemicals. Crude naphthalene also available in tank cars and tank trucks.

ALLIED CHEMICAL NIACIN USP

The finest Niacin available, specifically intended for pharmaceuticals, animal and poultry feeds and the enrichment of flour. Blends with soy flour available for the manufacture of vitamin premixes. Produced to meet the highest standard of purity through basic position in raw materials and the most modern equipment—conforms to USP specifications. Can be ordered from our manufacturing plant in Philadelphia and warehouses at Los Angeles and Chicago.



CUMAR® RESINS

One of the earliest developments in synthetic resins, these paracoumarone-indene resins continue to find broad markets in a dozen industries. They are available in nine separate grades for use in varnishes, floor tile, natural and synthetic rubber products, printing ink, adhesives and waterproofing materials. They are also used in the leather, electrical, radio, and paper industries.

OTHER CHEMICALS AND PRODUCTS OFFERED BY THE PLASTICS AND COAL CHEMICALS DIVISION

- Maleic Anhydride
- Fumaric Acid
- Resin S (A neutral synthetic resin of high styrene content)
- Specialized Rubber Compounding Materials
- "A-C" Polyethylene Lubricants
- Acetone
- Ethylene Glycol
- Diethylene Glycol
- Monoethanolamine
- Diethanolamine
- Triethanolamine
- Flotation Agents
- Pickling Inhibitors
- Tar Distillates

CUMENE

Though used principally in the manufacture of phenol, cumene can be employed in the production of alpha methyl styrene by catalytic dehydrogenation . . . as a constituent of aviation gasoline . . . and in other areas of chemical synthesis.

CUMYL PHENOL

This high-purity aromatic has interesting potential as an intermediate. It has been used to produce synthetic resins, insecticides and lubricating oil additives. Like so many commercial aromatics, cumyl phenol poses a challenge to development chemists.

PLASTICS AND COAL CHEMICALS DIVISION,
Allied Chemical Corp., 40 Rector Street, New York 6, N. Y.

Please send me specific product data for:

☐ Rubber Industry ☐ Paint Industry

☐ Plastics Industry ☐ Soap and Specialties Industry

☐ Technical data and laboratory samples

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ADDRESS_____

NEW FRUEHAUF "AIRSLIDE"* PRESSURE TANK-TRAILER

...Unloads 120 Barrels In 36 Minutes!

FASTER UNLOADING and lower equipment cost are the two big assets of Fruehauf's new "Airslide" Pressure Tank-Trailer for bulk commodities.

This economical unit is capable of pumping aerated cement at a rate of 3.33 barrels per minute for a distance of 105 feet or more, including up to 85 feet upwards into storage elevators. The Trailer has a 105 to 120 barrel capacity, and is equally suited to many powdered solids. Pneumatic unloading through a 4-inch hose at 11 pounds pressure is accomplished either with a tractor-mounted blower connected to the power take-off shaft or with a gasoline engine mounted on the Trailer.

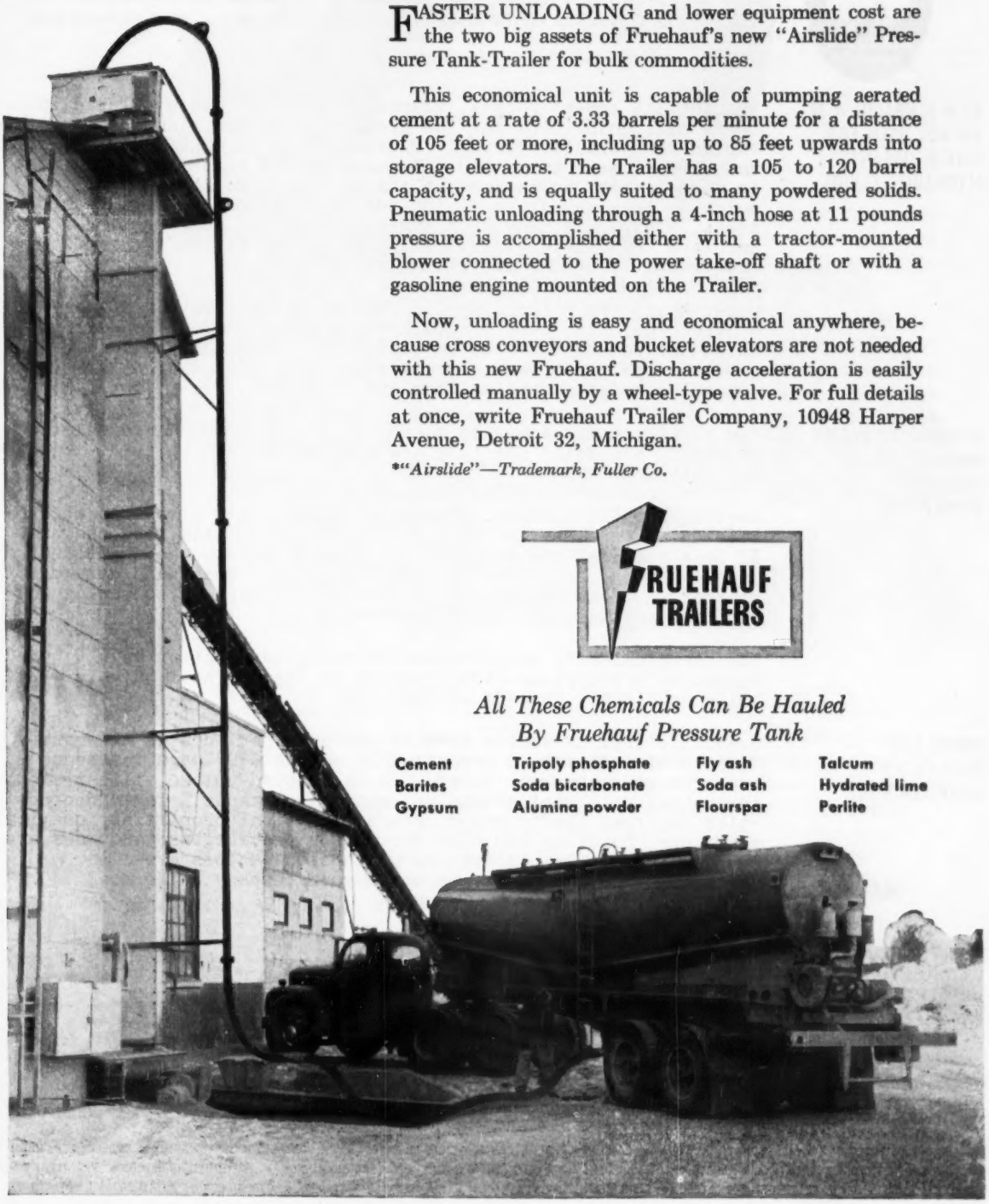
Now, unloading is easy and economical anywhere, because cross conveyors and bucket elevators are not needed with this new Fruehauf. Discharge acceleration is easily controlled manually by a wheel-type valve. For full details at once, write Fruehauf Trailer Company, 10948 Harper Avenue, Detroit 32, Michigan.

**"Airslide"—Trademark, Fuller Co.*

FRUEHAUF TRAILERS

All These Chemicals Can Be Hauled By Fruehauf Pressure Tank

Cement	Tripoly phosphate	Fly ash	Talcum
Barites	Soda bicarbonate	Soda ash	Hydrated lime
Gypsum	Alumina powder	Flourspar	Perlite



CHEMICALS OUTLOOK

May, 1959

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

NEW PLURACOL V 10 POLYOL USED FOR FIRE-RESISTANT HYDRAULIC FLUIDS

Wyandotte's newest polyol, Pluracol* V 10, is now available in commercial quantities for the production of non-flammable and non-explosive hydraulic fluids. Pluracol V 10 is easily inhibited, and noncorrosive to metals. Because of its high viscosity index in formulation, it is used as the thickener portion of water-soluble, fire-resistant fluids for applications in fire hazard areas. There are many such applications . . . die-casting machines, hydraulic glass-forming machines, aircraft catapults, and fork lift trucks are but a few of them.

Other Wyandotte polyols include the Pluracol E series of polyethylene glycols (four liquid and six solid grades, ranging in molecular weight from 200 to 6,000) . . . and the Pluracol P series of polypropylene glycols (four liquid grades, with molecular weights ranging from 400 to 2,000).

WYANDOTTE BEGINS PRODUCTION OF PROPYLENE DICHLORIDE

The first plant run has been completed, and propylene dichloride shipments are going out from new processing facilities at Wyandotte, Michigan.

Meeting highest industry standards, Wyandotte's propylene dichloride is an excellent solvent for waxes, oils, fats, and resins. It is a chemical raw material for amines, esters, and chlorinated hydrocarbons . . . a fumigant for peach tree borer and wireworm control . . . an ingredient in carburetor cleaners, cleaning and spotting agents, and rubber cements.

For technical data and detailed shipping information on Wyandotte's propylene dichloride — or the Pluracol polyols — write us direct, in care of Dept. CO.

WRITE FOR FACT-FILLED SODA ASH BOOK

Wyandotte drew on nearly seventy years' experience in the manufacture of soda ash to prepare this compact, 96-page reference book for your chemical files. It is a bound volume, illustrated throughout with photographs and photomicrographs. Text incorporates numerous charts and diagrams. Physical properties, chemical reactions, handling and storage, safety precautions, and uses are covered in detail. Tables and conversion factors are also included. For a copy, write us on your company letterhead in care of Dept. CO.

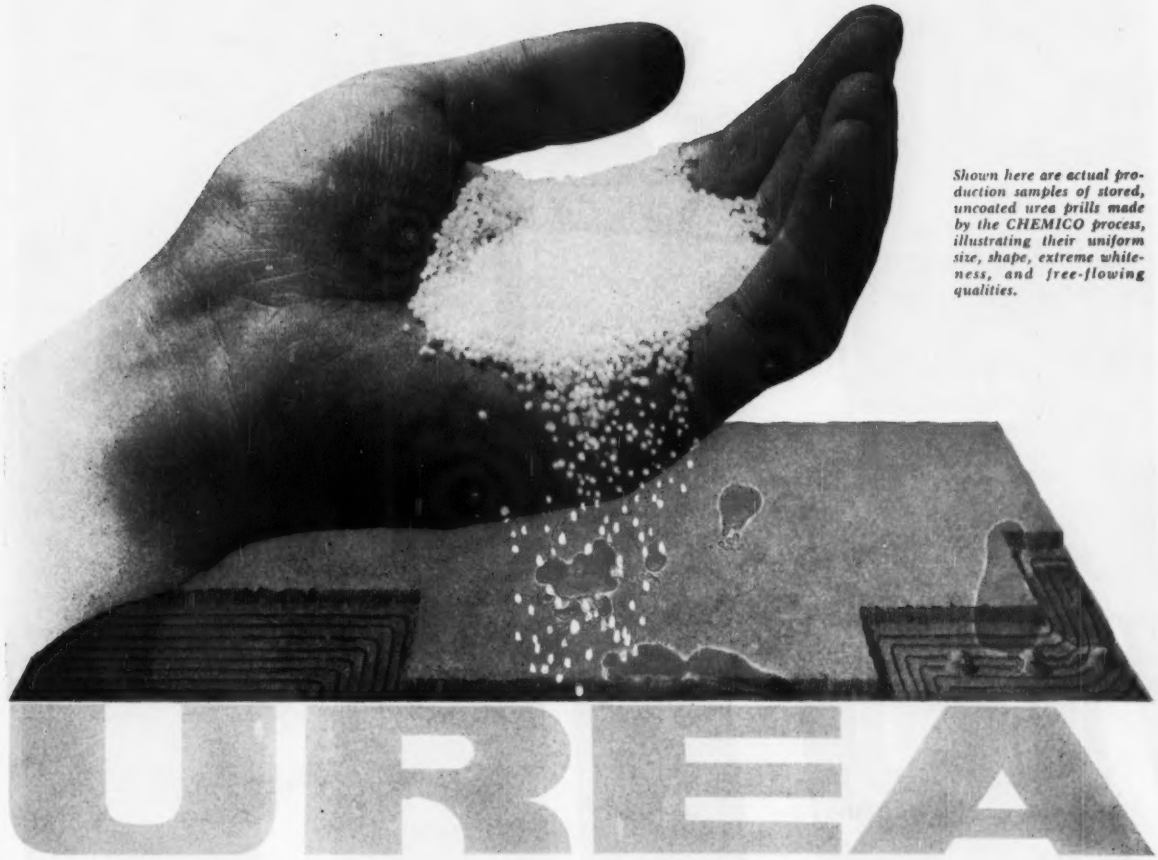
*REG. U.S. PAT. OFF.

Wyandotte CHEMICALS

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • OFFICES IN PRINCIPAL CITIES

SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE • MURIATIC ACID • HYDROGEN • DRY ICE
GLYCOLS • SYNTHETIC DETERGENTS (anionic and nonionic) • SODIUM CMC • ETHYLENE OXIDE • ETHYLENE DICHLORIDE • POLYETHYLENE GLYCOL • PROPYLENE OXIDE
PROPYLENE DICHLORIDE • POLYPROPYLENE GLYCOL • DICHLORODIMETHYLHYDANTOIN • CHLORINATED SOLVENTS • OTHER ORGANIC AND INORGANIC CHEMICALS

LOOKING FOR A GROWTH SITUATION?



Shown here are actual production samples of stored, uncoated urea prills made by the CHEMICO process, illustrating their uniform size, shape, extreme whiteness, and free-flowing qualities.

UREA

Over 1000 tons per day in production or under construction! That's the story of CHEMICO's process for making urea, one of the fastest growing chemicals in the feed, fertilizer and raw plastics fields. With its high nitrogen content, urea gives more plant food value per ton with lower handling costs. In the plastics industry, urea-formaldehyde resins are used extensively as textile and paper treating agents, adhesives, and molding compounds.

With costs a decisive factor in the urea market, the exclusive CHEMICO process offers increased efficiency, higher yields and a product with a guaranteed 46% nitrogen content. CHEMICO also offers the only commercially available, American-developed process. If you are considering the erection of a urea plant, contact CHEMICO's sales department for details on the performance-proven CHEMICO process.

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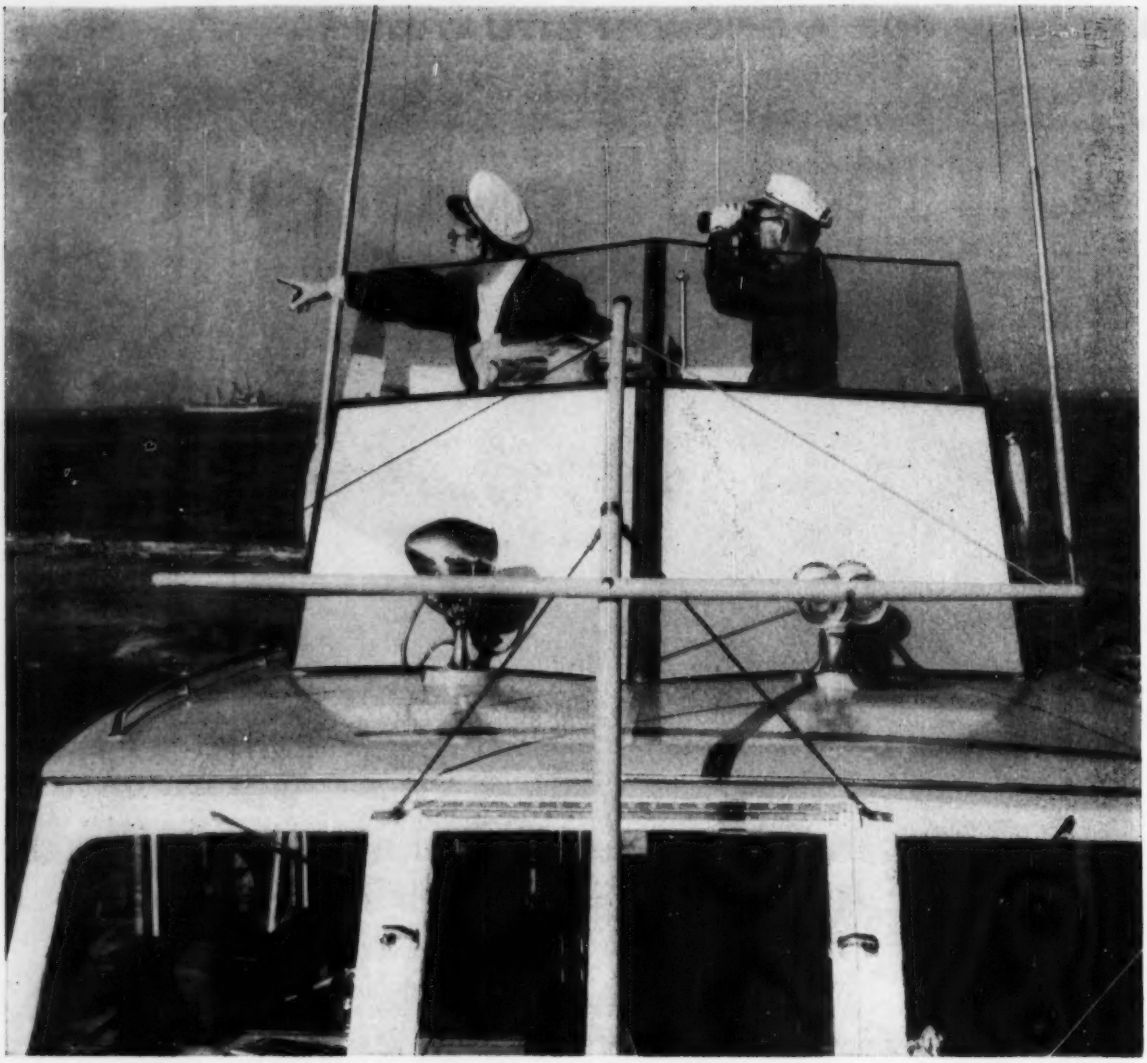
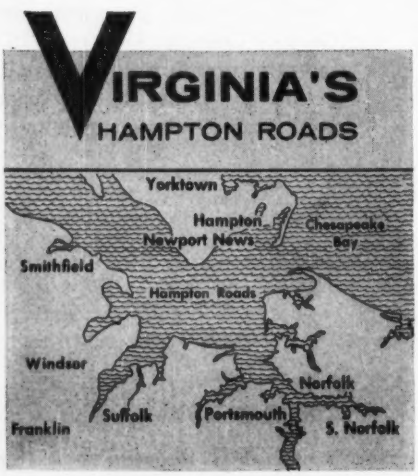


You could dock the largest freighter at our new plant!

Deep water frontage on Virginia's busy Hampton Roads offers industrial advantages and living advantages in *depth*. You're central to the whole Atlantic Coast. A hundred ship lines link you with world ports. You enjoy superb, long-season boating, swimming, fishing.

Vepco serves this area with a generating capability of over 1,700,000 kilowatts, due to exceed 2,000,000 kilowatts by 1961. And Vepco *knows* this area intimately. For confidential deep-water site-finding help, write or phone



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VIRGINIA ELECTRIC and POWER COMPANY

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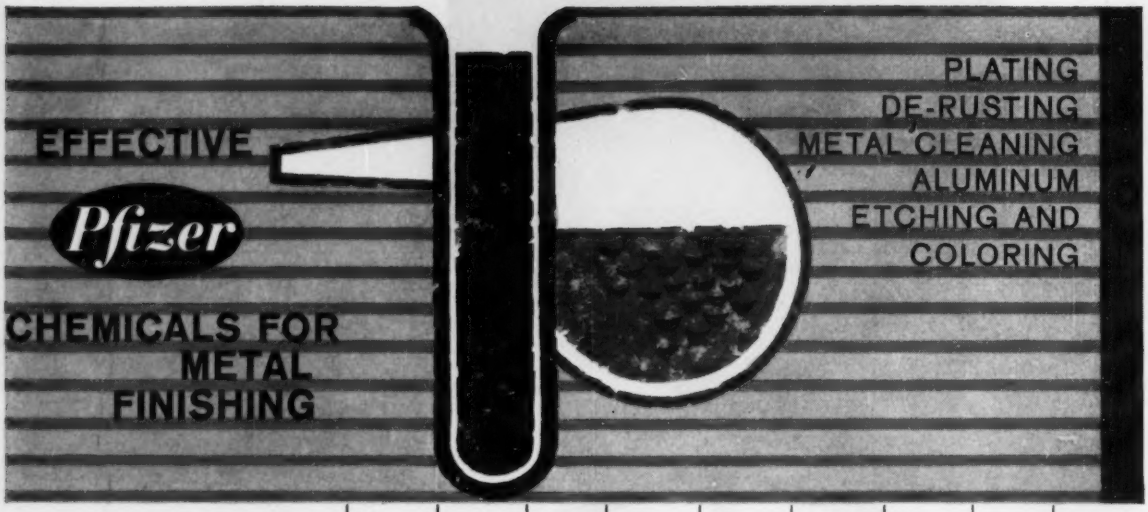

	Cleaning	Polishing	Pickling	Electroplating	Electropolishing	Non-Electrolytic Depositions	Electrolytic Oxidation	Etching	Gold Coloring of Aluminum
Citric Acid	✓	✓	✓	✓	✓	✓	✓	✓	
Sodium Citrate	✓	✓		✓		✓			
Ammonium Citrate	✓	✓	✓	✓					
Gluconic Acid	✓	✓	✓	✓				✓	
Glucono Delta Lactone	✓	✓	✓	✓				✓	
Sodium Gluconate	✓	✓		✓				✓	
Oxalic Acid	✓	✓	✓	✓	✓		✓	✓	
Ammonium Oxalate	✓	✓		✓					
Ferric Ammonium Oxalate									✓
Tartaric Acid	✓		✓	✓				✓	
Tartar Emetic				✓					
Rochelle Salt			✓	✓					
Cream of Tartar	✓			✓					

Citric Acid...
Nontoxic, mild, yet chemically active against scale and tarnish. Used extensively in the formulation of general metal cleaners and polishes, particularly household products.

Sodium Citrate...
A preferred ingredient in electroless nickel baths, resulting in a brighter plate. Also finds wide use in electroplating processes.

Ammonium Citrate...
Especially useful for the removal of rust in near neutral solutions. Extremely mild and safe to handle.

Gluconic Acid...
An excellent sequesterant in alkaline derusting solutions; provides rust-free, clean surface ready for further treatment. Also highly effective in aluminum etching and paint stripping compounds.

Oxalic Acid...
The most effective chemical for use in automobile radiator cleaners. Also finds wide use in electropolishing and as an ingredient in general metal cleaners.

Ferric Ammonium Oxalate...
Used extensively in the production of light-fast gold colored aluminum.

Tartaric Acid...
Excellent complexing agent for copper in electroplating.

Tartar Emetic...
Used in electrolytic baths for deposition of silver and antimony alloys on brass, copper and steel surfaces.

Rochelle Salt...
Increases efficiency and yields finer-grain deposit in alkaline copper plating.

Cream of Tartar...
An excellent additive for brass cleaning compounds. Its crystalline structure acts as an effective abrasive in paste polishes. Chemically active against tarnish.

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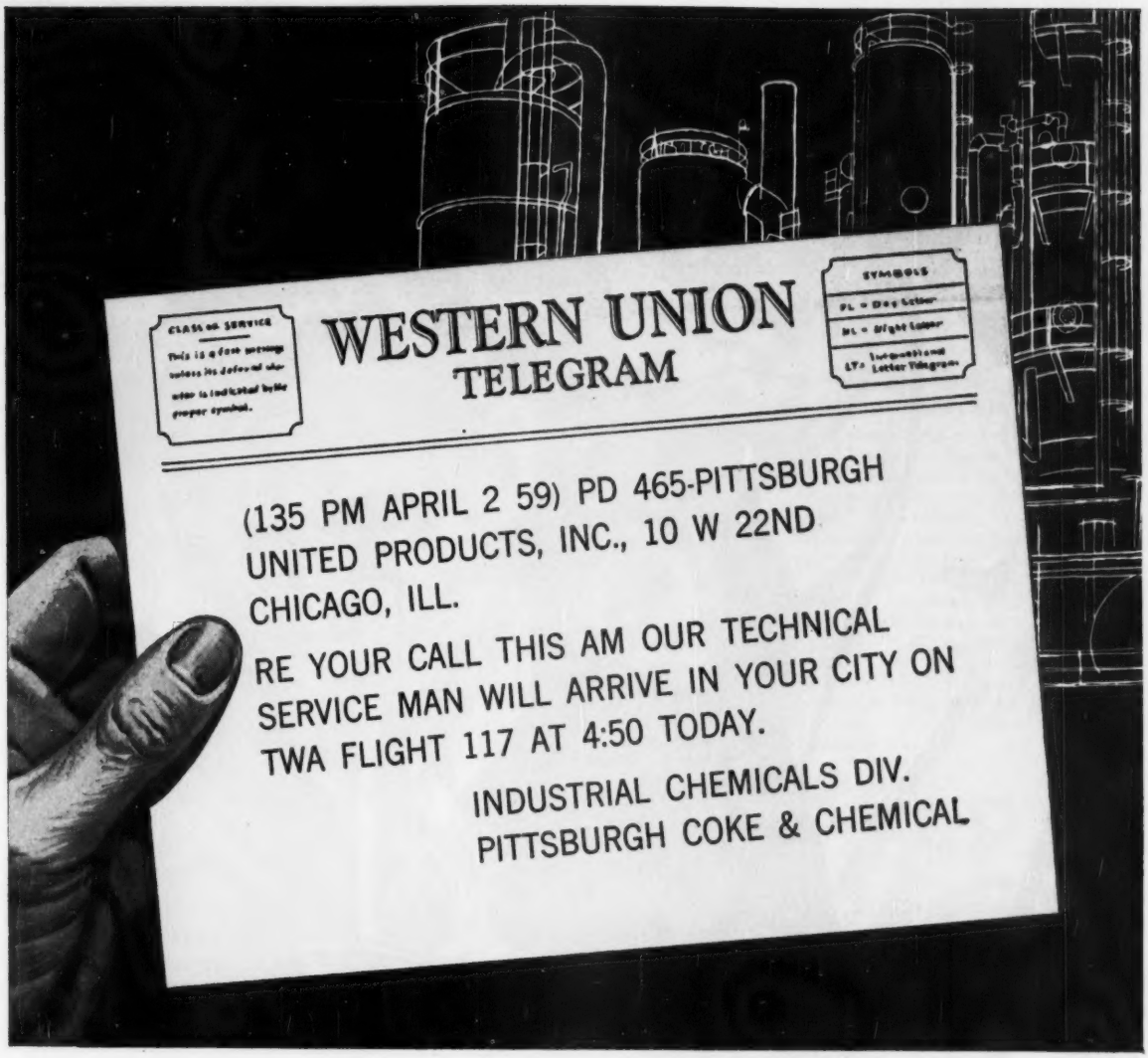
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Pittsburgh Coke's job as a basic supplier of industrial chemicals only *begins* when your shipment leaves our plant. For often, you may be planning to utilize the uniform purity of Pittsburgh Chemicals to help you upgrade product quality . . . or to cut production costs by reducing down time.

Whatever your plans, you'll find that the services of a Pittsburgh Technical Service man are completely at your service . . . right on your plant floor when needed.

Our experienced Technical Service men (and technical service is their *full time* job) know processing and production from *your* side of the business. You'll appreciate the "sleeves-up" way they tackle a materials application problem.

The next time you need processing help, call for a Pittsburgh Technical Service Representative. A phone call or wire will bring prompt action.

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Who Discovers the Discoverers?

"A professor can never better distinguish himself in his work than by encouraging a clever pupil, for the true discoverers are among them, as comets amongst the stars." CARL LINNAEUS

Somewhere in this mighty land of ours, a gifted youth is learning to see the light of tomorrow. Somewhere, in a college classroom or laboratory, a dedicated teacher is gently leading genius toward goals of lofty attainment. Somewhere the mind of a future discoverer—in science, engineering, government, or the arts—is being trained to transcend the commonplace.

Our nation has been richly rewarded by the quality of thought nurtured in our colleges and universities. The caliber of learning generated there has been responsible in no small part for our American way of life. To our college teachers, the selfless men and women who inspire our priceless human resources, we owe more than we will ever be able to repay.

Yet how are we actually treating these dedicated people? Today low salaries are not only driving gifted teachers into other fields, but are steadily reducing the number of qualified people who choose college teaching as a career. At the same time, classrooms are beginning to get overcrowded. In the face of this, college applications are expected to double by 1967.

This is a severe threat to our system of education, to our way of life, even to our very existence as a nation. Our colleges need help—and they need it now!

HIGHER EDUCATION
KEEP IT BRIGHT

If you want to know more about what the college crisis means to you, and what you can do to help, write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, New York.

ADVERTISING COUNCIL PUBLIC SERVICE

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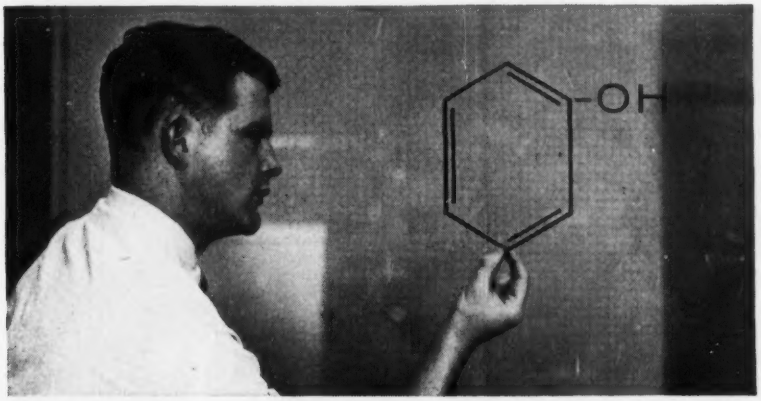
BRIEFS

on a top quality phenol...a highly reactive, promising cyclopentadiene ...the many ways to buy Oldbury® phosphorus pentasulfide



99.8% phenol at no extra cost

Now you can order shipments in large quantities of Hooker phenol that assays typically at 99.8% purity by bromination.

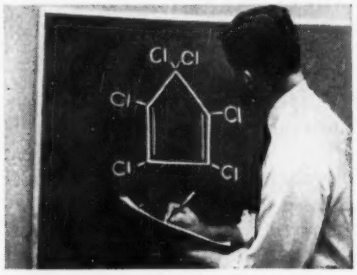
Another indicator of quality is this product's freezing point—a minimum 40.6°C.

Its distillation range is only 2° from first point (180°C) to dryness.

Hooker phenol meets or exceeds all requirements of U. S. Pharmacopoeia XV.

For more complete specifications and other data, send the coupon.

Bulletin on handling phenol. The Manufacturing Chemists Association has put out a Chemical Safety Data Sheet on phenol which we are offering as Hooker Bulletin 166. You can get a copy of this also by sending the coupon.



You might find a new product in this cyclopentadiene group

Take a look at those six active chlorines and the two double bonds.

They are an open invitation to the study of such derivatives as the acids, acid chlorides, acid anhydrides, esters, amides, ketones, *di*-ketones, quinones, acetals, nitriles, and fluorocarbons.

Many of these end products have already found markets as insecticides, germicides, fungicides, pharmaceuticals, dyes, and non-flammable resins.

We think the story on C-56® (hexachlorocyclopentadiene) is just beginning—that the creative chemist will use this versatile chlorocarbon to develop many more profitable products.

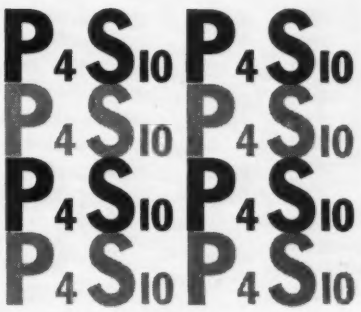
If you can see something in C-56 for your research, send the coupon for more technical information. If you'd like a sample, too, write for it on your business letterhead.

Many ways to buy phosphorus pentasulfide

Could one of the many forms of Oldbury® brand phosphorus pentasulfides help improve your product?

Are you color conscious about your product, for example? We make a special distilled grade (it sells at no extra cost) which is freer than standard P_4S_{10} of the carbonaceous materials which can discolor a product.

Do you want a finer or a coarser powder? We offer three mesh sizes of both standard and distilled grades as well as solid in standard grade. The mesh sizes are 20, 6 and 2. For descriptive technical data sheets, check the coupon below.



If you're worried about ample supply at any time, mark the fact that we have two producing plants—one at Niagara Falls, N. Y. and one at Columbus, Mississippi.

We also make phosphorus heptasulfide and phosphorus sesquisulfide.

Complete data on all three are offered in the coupon.

For more information, check here and mail with your name, title, company and address.

- ☐ Handling Phenol, Bulletin 166
- ☐ Phenol Data Sheet No. 811
- ☐ Hexachlorocyclopentadiene, Data Sheet No. 815
- ☐ Phosphorus Pentasulfide, Data Sheet No. 801
- ☐ Phosphorus Heptasulfide, Data Sheet No. 798
- ☐ Phosphorus Sesquisulfide, Data Sheet No. 803

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WONDERWALL® did it— *cut breakage down to less than one bag per car*

Fact! That's the report coming to us from Mr. R. H. Pierce, Purchasing Agent of Cooperative Farm Chemicals Association, Lawrence, Kansas. Mr. Pierce states:

"Our tests with WONDERWALLS convinced us—showed less than one broken bag per freight car. Then, in our first shipment—14 cars of fertilizer in WONDERWALL bags, we found only 9 broken bags, 6 of which were caused by nails.

"We are using WONDERWALLS that are 20 pounds lighter in total paper basis weight than the ordinary kraft multiwalls we had been using, and we know we're getting a better bag.

"The single biggest advantage in using WONDERWALL bags is satisfied customers."

WONDERWALL is West Virginia's new, tougher multiwall that outperforms ordinary bags because it's made of Kraftsman Clupak* paper. This extraordinary paper stretches and withstands punishment that breaks ordinary kraft.

See how the WONDERWALL would reduce your breakage and, very possibly, also *cut actual bag expense.*

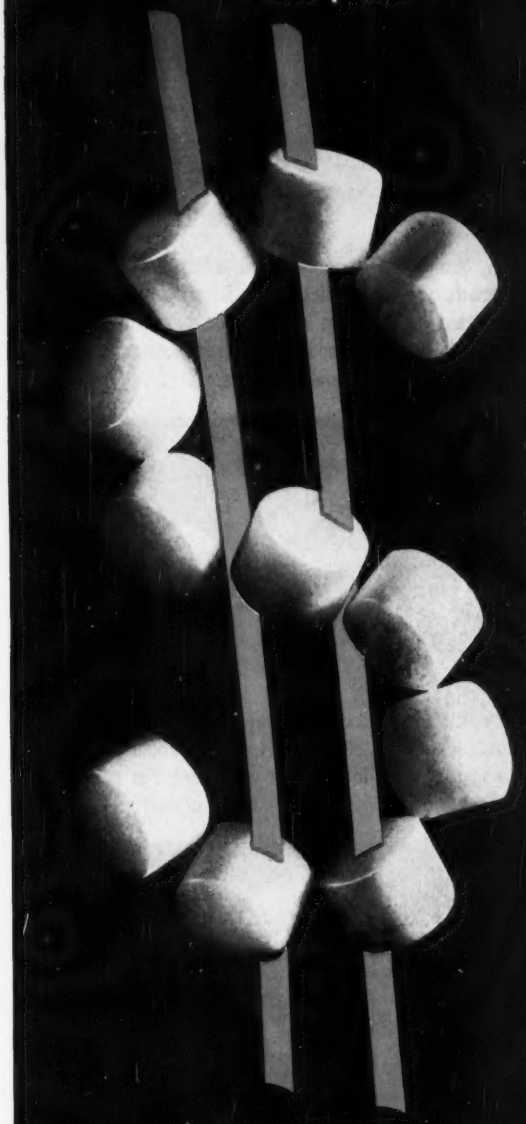
Let a West Virginia representative show you how you can save with WONDERWALL. Just write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N.Y.

Clupak, Inc. trademark for extensible paper manufactured under its authority.

WONDERWALL™
Best bag of all

West Virginia Pulp and Paper

their Shape
assures Savings -
for you



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75-90% fewer fines	Uniform melting
Less contamination	Lower kettle costs
Easy to handle and weigh	Maximum yield
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NATIONAL® MALEIC ANHYDRIDE TABLETS

Savings for you start with our exclusive catalytic-oxidation Maleic Anhydride process. Savings for you are added by exclusive controlled-pressure tableting to give you a dense uniform product that is easy and economical to use.

And for still greater savings, you get mixed car or truckload rates on combination orders for these National Resin Chemicals:

Maleic Anhydride	Tetrahydrophthalic Anhydride
Fumaric Acid	Hexahydrophthalic Anhydride
Phthalic Anhydride	Dodecenylsuccinic Anhydride
Adipic Acid	NADIC® Anhydride
Succinic Anhydride	NADIC® Methyl Anhydride
NADONE® Cyclohexanone	
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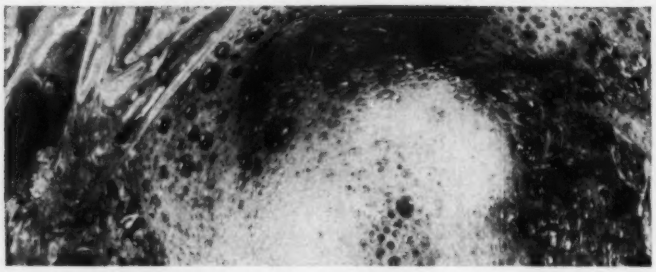
Milestones In Hydride Chemistry

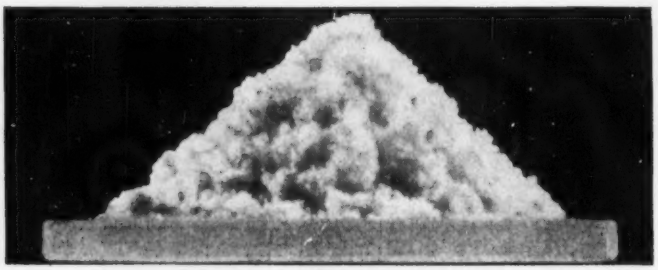
BOROHYDRIDE APPLICATIONS SPREAD AS MHI EXPANDS PRODUCT FORM AVAILABILITY

SWS — Stabilized Water Solution, a new form of sodium borohydride available in commercial quantities at a price less than half of the pure material. Sodium Borohydride-SWS is a stable, aqueous caustic solution. The sodium borohydride content is about 12 weight percent and is ideal for use in cleaning up small amounts of carbonyl and peroxides in organic products.



PELLETS — now, both sodium borohydride and potassium borohydride are available in smooth, crowned pellet form. Simplifying handling and eliminating dust, pelleted borohydrides open applications for continuous fixed-bed, in-stream carbonyl group and peroxide reductions. Size availability include 10/32″ and 24/32″ diameter pellets.

PURE POWDER —98% pure sodium borohydride and 97% pure potassium borohydride, both white crystalline solids, are remarkably stable and easily used with complete safety in standard equipment. For convenience of use both are shipped in polyethylene-lined cans or drums.



MHI Technical Service will gladly provide complete information concerning the new borohydride forms as well as qualified assistance in applying them to your process.

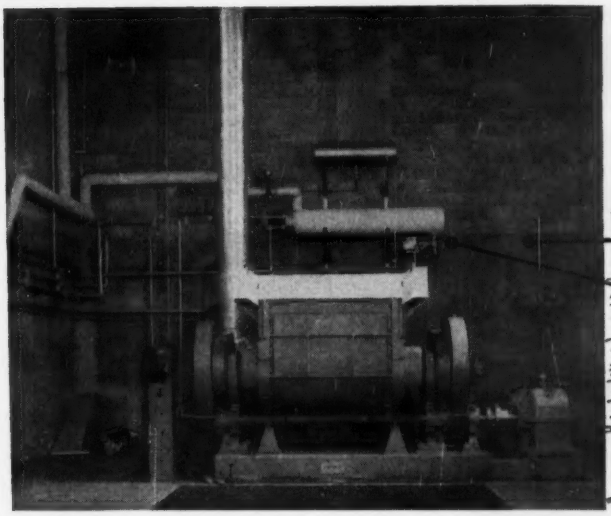
Write for MHI's new publications, "Sodium Borohydride, Potassium Borohydride, Manual of Techniques", and "Selective Reductions of Organic Compounds with Complex Metal Hydrides."

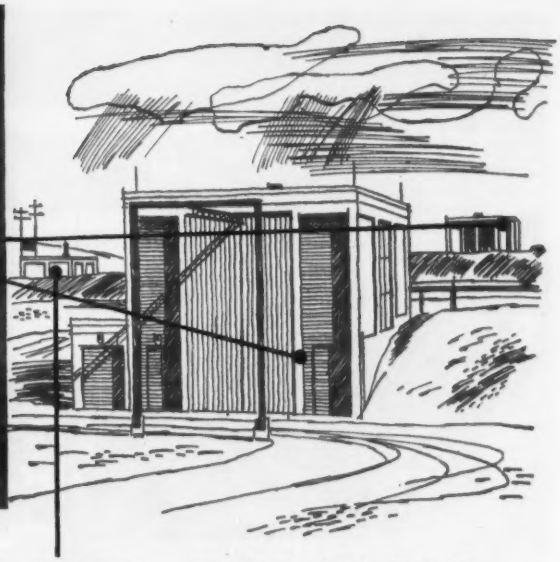
CHEMICAL HYDRIDE DIVISION

Metal Hydrides Incorporated

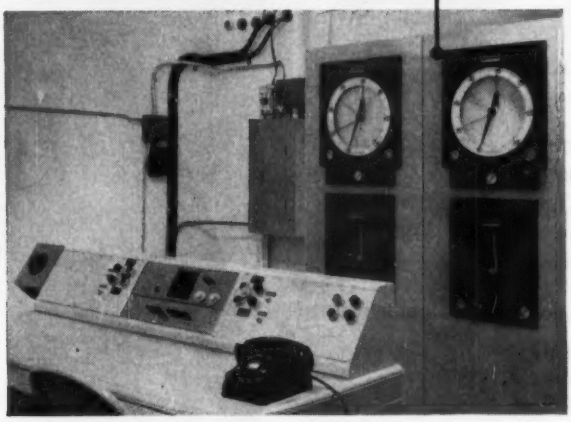
PIONEERS IN HYDRIDE CHEMISTRY

418 CONGRESS STREET, BEVERLY, MASSACHUSETTS





TWO MORE BAKER PERKINS MIXERS ON THE JOB at new Thiokol® solid propellant plant in Utah



Inorganic oxidizers, the chemicals which make solid rocket propellants burn with such intensity, are first ground to a particle size . . . blended thoroughly . . . then mixed with an elastomeric binder. Fundamentally, that's how Thiokol Chemical Corporation makes a fuel for a rocket motor. The mixing of high energy fuels is a delicate, exacting operation and the mixers must be highly efficient and absolutely dependable.

At the Brigham City, Utah plant, Thiokol has recently installed two more Size 18 JWRM-2 Baker Perkins mixers. Each of these mixers is constructed of stainless steel and has a 300 gallon working capacity. The units, housed in specially constructed buildings, are remote controlled from another building.

Because they are safe *and* efficient, more and more B-P mixers are being used by the rapidly expanding propellant industry. These same high standards of quality are also incorporated into the standard design mixers built for the chemical process industry.

Whatever your requirements may be, Baker Perkins builds mixing machinery to handle every job. Why not write today for Bulletin No. CE-58 containing information on B-P equipment for the chemical process industries.

See our insert in Chemical Engineering Catalog.

BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION • SAGINAW, MICHIGAN

365

HARSHAW CATALYSTS

are available in 6 forms:

TABLETED • EXTRUDED • GRANULAR
SPHERES • FLAKES • POWDERS

We'll assist you in developing the best and most economical catalyst for your needs. Our more than 20 years catalyst experience and acres of production and research facilities are ready to work for you. Harshaw produces carloads of catalysts every week —this capacity guarantees prompt shipment of your catalyst order.

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to fit special process requirements

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Aluminum Nitrate	Metallic Soaps (Cobalt, Manganese)	
Manganese Nitrate Solution	Cobalt Nitrate	Copper Nitrate
Nickel Carbonate	Nickel Formate	Nickel Nitrate
Nickel Sulfate	Sodium Methoxide	Zinc Nitrate

Our experienced technical staff will assist you in developing the best and most economical catalyst. If you have a catalytic process in the development or production stage, a discussion with us may prove beneficial.

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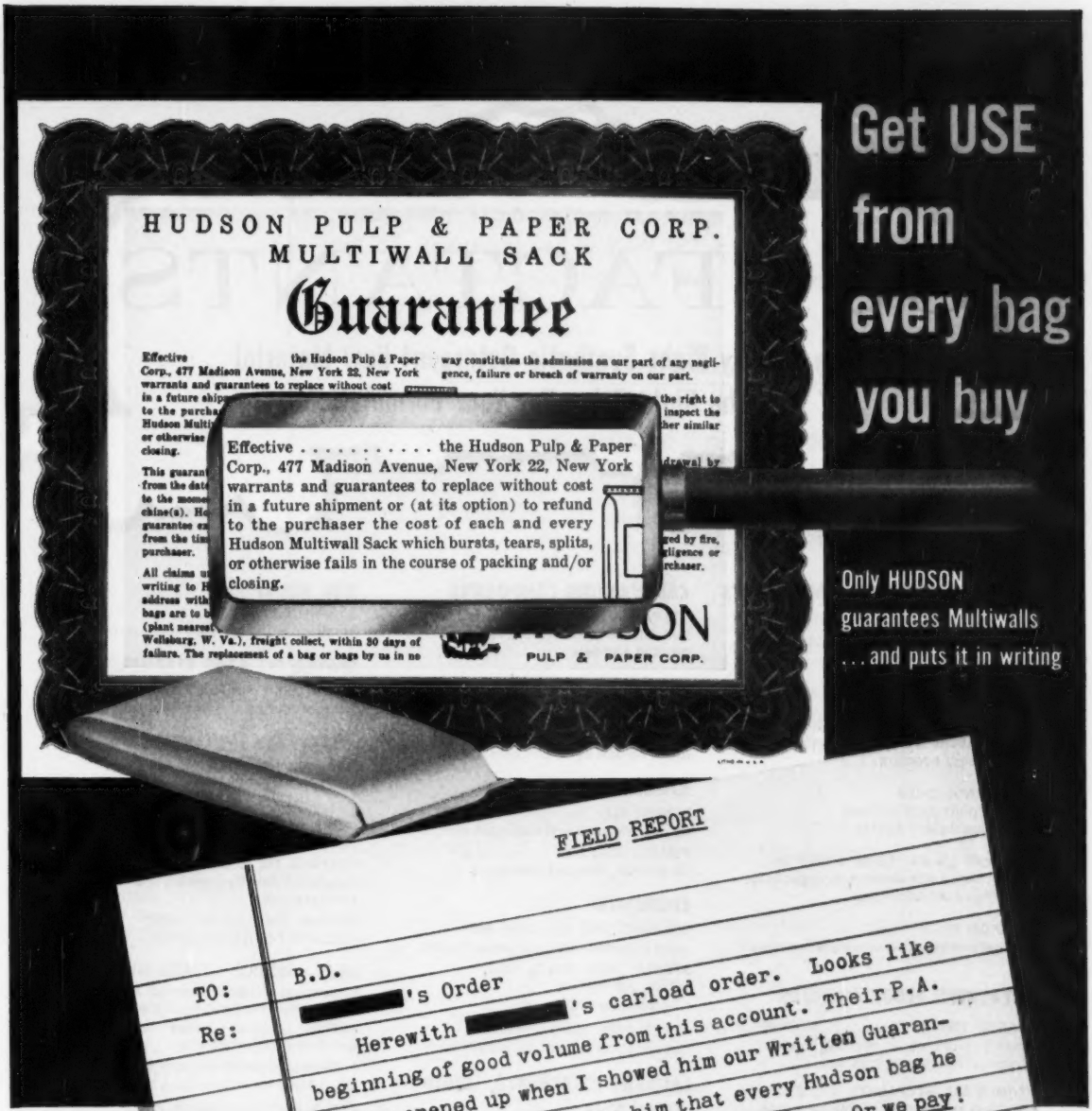
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FIELD REPORT

TO: B.D.

Re: [redacted]'s Order

Herewith [redacted]'s carload order. Looks like beginning of good volume from this account. Their P.A. really opened up when I showed him our Written Guarantee policy. Explained to him that every Hudson bag he pays for is guaranteed to be a bag he can use. Or we pay!

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Business
Newsletter

CHEMICAL WEEK
May 9, 1959

Trane Co. joins equipment makers riding the current upturn—after a slump in the first quarter (*see also p. 43*). Trane's first-period sales were $16.6 million vs. $20.6 million in the first three months of '58. Profits dropped to $577,787, compared with $1.5 million last year. The company reports, however, that March orders were well above last year's March totals.

And drug firms keep chalking up new earnings records despite lighter profit margins.

Sterling Drug netted $5.3 million in the quarter ended March 31, compared with $4.9 million last year. Sales rose 3.3%, to $53.2 million.

Vick Chemical's sales, in the nine months ended March 31, were $89.3 million vs. $86.1 million in the comparable '57-'58 period. Profits soared to $10.4 million, up 15%.

Less fortunate was Schering, with sales of $19.8 million and an after-tax net of $2.7 million, down 3% and 22%, respectively. Actually, the company reports, demand increased for its newer corticosteroids, cold remedies and tranquilizers, but the gain was more than offset by a drop in other steroid sales. So far this quarter, says Schering, the sales decline has been checked.

Miles Laboratories posted sales of $17.2 million for the quarter, compared with $16.1 million last year. Profits, however, sagged to $1.2-million, down 17%.

American Home Products' three-months sales were $119.5 million vs. $106.5 million in '58. Net profits rose to $11.6 million, up 10%.

•

One result of climbing earnings: criticism of managements has been mild and scarce. Stockholders are generally in a mellow mood, and representation and attendance have been above average at most annual meetings this spring.

Even last year's dividend cuts—such as the one by Olin Mathieson—didn't result in fireworks at this year's shareholder get-togethers. (The uprising on the part of a few big investors in Commercial Solvents came several months ahead of the meeting; the meeting itself was a quiet affair, at which the managerial shakeup was calmly ratified.)

At Olin Mathison's meeting last week, no one even mentioned last year's dividend cut or asked about chances of going back to the old 50¢/quarter rate. And the directors were all re-elected without any discussion of the harsh judgments that were being passed on the company by various outsiders last summer (*CW Business Newsletter, Sept. 6, '58*).

In fact, only four questions were asked by the 100 shareholders attending the meeting in East Alton, Ill., across the river from St. Louis.

Three of these dealt with OM's aluminum ventures; and executives seemed to welcome the opportunity to justify their big moves into aluminum. Executive Committee Chairman John Olin—noting that a fivefold increase in tonnage sales by '75 has been forecast for the aluminum industry—declared that, as a shareholder, he is happy that OM is in this business. President Stanley Osborne said he's looking forward to aluminum sales of more than $100 million/year when all units are operating at capacity.

OM had recently disclosed that from '59 through '63, it will be paying an extra 5¢/lb. on primary aluminum bought from Ormet (jointly owned by OM and Revere Copper & Brass). This is to help Ormet repay $100 million in bank loans over the five-year period. But at last week's meeting, Osborne made a point of telling stockholders that despite that five-year, 5¢ levy, "actual cost of the metal during the first quarter was below the current market price of pig aluminum."

•

How advantageous is it to have your headquarters in New York?

Management consultants have recommended that Hooker Chemical move its corporate offices to "the heart of the national business and banking center." But Hooker is not in any hurry to leave Niagara Falls, N.Y., where the company has been based since it started operating 54 years ago.

Taking note of community feelings after a Buffalo newspaper reported that the company was considering a move to Manhattan, Board Chairman R. Lindley Murray issued a statement emphasizing that "there is no question" but that Hooker's largest division (Eastern Chemical) will stay at Niagara Falls; and that if the company ultimately decides on a move "it would involve only a very small number of people."

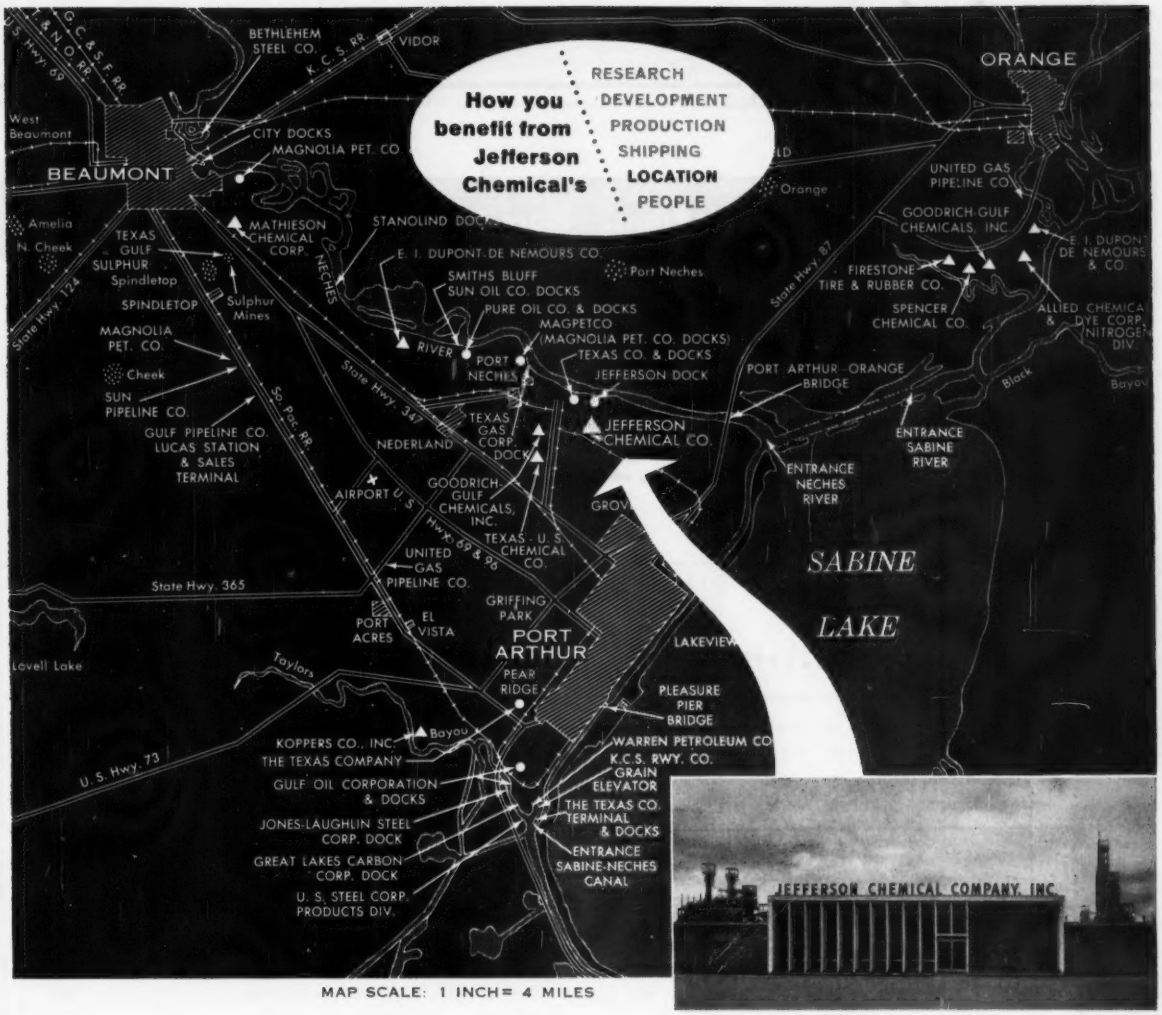
•

Look for more chemical companies to set up shop in Holland. This small nation within the European "Common Market"—with big seaports linked by river and barge lines to populous inland areas—is growing as a chemical center. Last week's Dutch acquisition by the Fluor Corp. (*p. 43*) was accompanied by these developments:

• Continental Carbon Co. (jointly owned by Continental Oil, Witco Chemical and Shamrock Oil & Gas) is building a $2.5-million carbon-black plant at Rotterdam. Initial capacity: 15,000 tons/year. A similar plant—backed by Godfrey L. Cabot and the Royal Sulphuric Acid Works—is going up in the same vicinity.

• Royal Dutch-Shell is planning to increase synthetic glycerine capacity at its Pernis works, near Rotterdam. In the first stage, capacity will be upped to 15,000 tons/year by early '60.

• N. V. Philips—a Netherlands-based operation specializing mainly in electronics—opened a plant at Maarheeze to make tungsten, molybdenum, fluorescent powders and zinc and cadmium sulfides.



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Jefferson invites you to come on in...the deep water's fine...land and resources plentiful!

Jefferson Chemical's 1100-acre plant site is located near the deep-channel Neches River and a short distance from the thriving industrial cities of Port Arthur and Beaumont, Texas. Water, rail and highway networks are excellent, giving you a choice of the most economical carriers.

More than 200,000 people live within short commuting distance from this Jefferson location. An ample supply of skilled and semi-skilled labor is available, with low housing costs and desirable environment to attract all needs for future growth.

A very favorable condition exists in the Neches area for fresh water, electric power and natural gas in abundance and at low cost . . . with future requirements well anticipated.

But of most importance is the availability of raw and processed materials in virtually unlimited supply such as ethylene, propylene, propane, chlorine, caustic soda, hydrogen and brine. All are readily available from Jefferson through short pipe lines.

We believe Jefferson's plant is ideally situated . . . production has been doubled in the past year, and more than adequate space and resources will permit us to grow as you grow . . . upward. Jefferson has considerable information on plant site availabilities and other details you will most likely want to know about the Neches area. Write about your specific interests to Jefferson Chemical Company, 1121 Walker Avenue, Houston 2, Texas.

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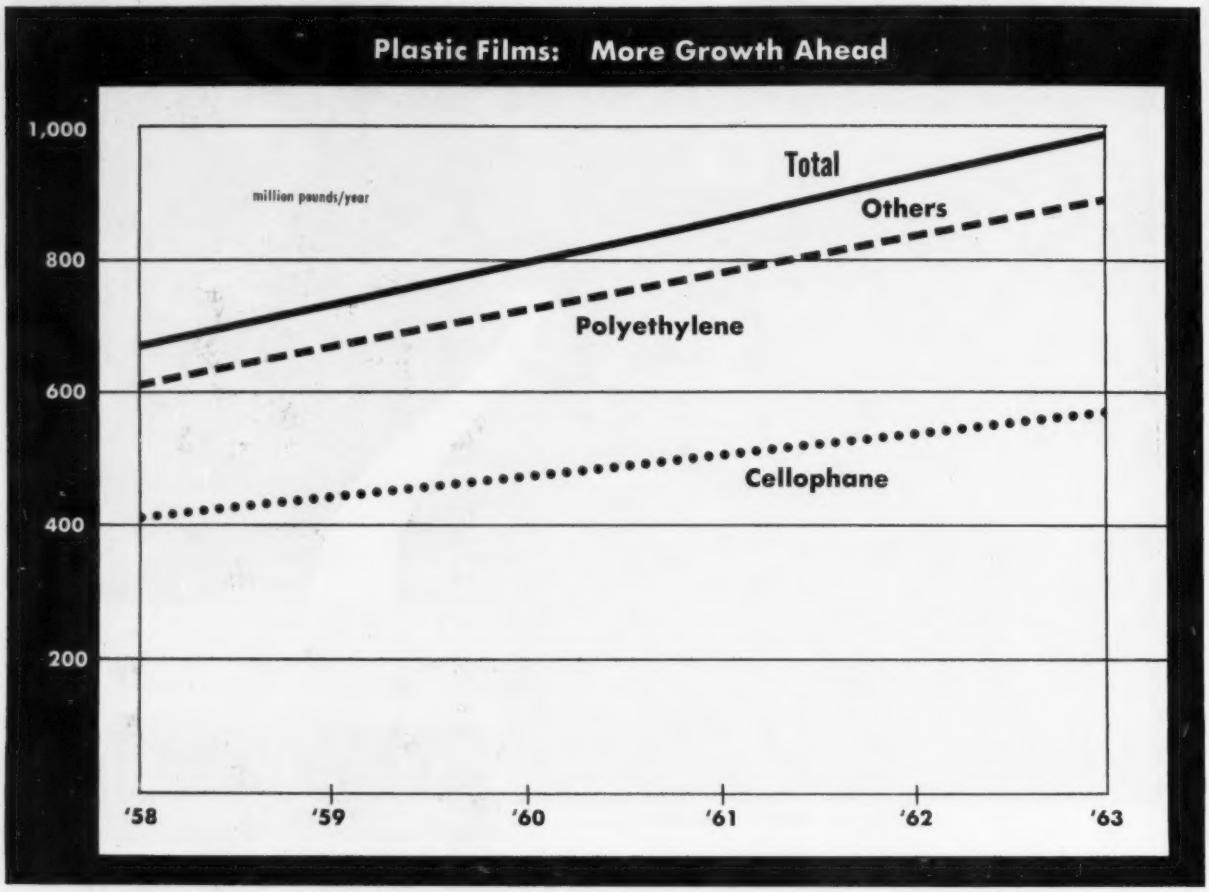


Each material's share of total represented by height at any point in labeled area.

Growth, Competition Keynote

The pace is quickening in the race for plastic film markets. This week, Du Pont has firmed up plans for a large Mylar film plant in Florence, S.C.; Hercules hints strongly of a big capacity boost for polypropylene; improved, superfast film-casting machines are about ready for sale; and polyethylene capacity is growing faster than ever before.

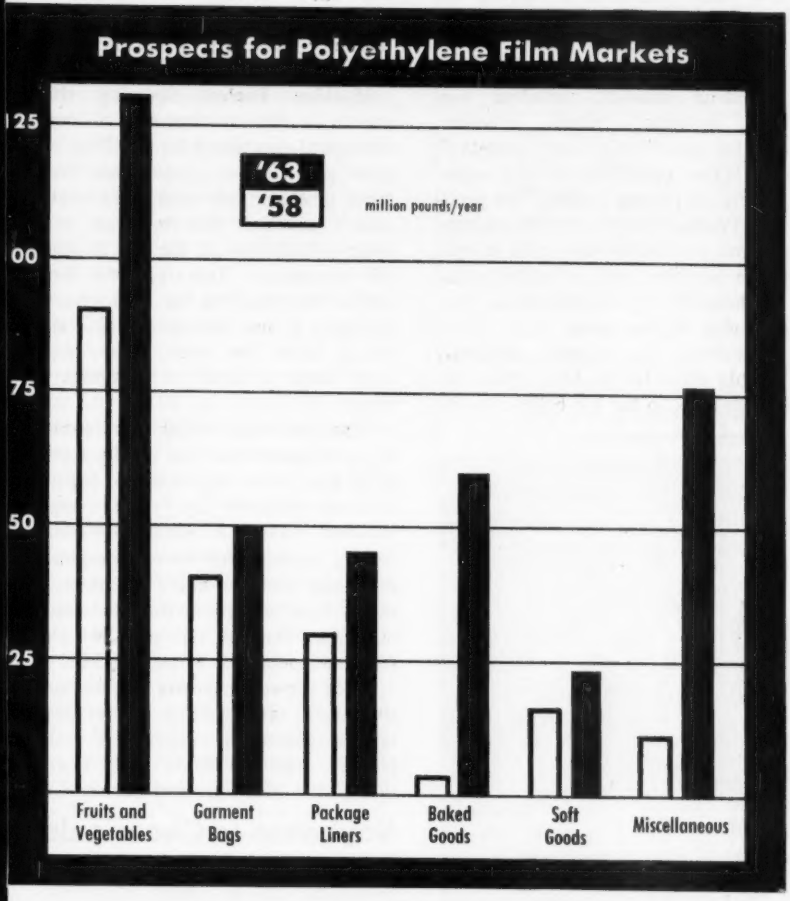
Cost of the Du Pont plant will be nearly $20 million. Construction will start next month. On completion, early in '61, the new unit will double the company's Mylar film capacity. In addition, Du Pont also recently drew up plans for a 70-million-lbs./year polyethylene unit to be completed in '60—with part of the output to be used for film.

Allied, too, has expansion plans. It will add 10 million lbs./year of polyethylene capacity to its Tonawanda, N.Y., plant, will build another 75 - million - lbs./year unit—probably in Orange, Tex. — by '63 (*CW Report, April 25, p. 35*); U.S. Industrial Chemicals (division of National Distillers), just in with a 75-million-lbs./year polyethylene unit, is blueprinting another at Houston, Tex., slated for '60; and Spencer will bring in a 100-million-lbs./year polyethylene unit in Longview, Tex., later this year.

Prompting these moves are some whopping market predictions (*see chart*).

- Film for bread: Biggest penetration is expected in the bread wrap field—a 250-million-lbs./year potential market. Cellophane has already captured about one-fourth of this. But, polyethylene makers are hoping to annex as much as 60 million lbs. by '63.

Polyethylene makers justify their optimism this way: polyethylene film will be as much as 17¢/lb. cheaper than cellophane; polyethylene-packaged bread will have a fresher "feel" because of the plastic's smooth, flexible surface and thermal-insulating effectiveness. Polyethylene's toughness



Plastic Film Outlook

and durability are also factors.

• Bagging frozen foods: But frozen foods provide the newest development in polyethylene-film packaging. Peas and beans are available in some West Coast supermarkets in 20-oz. and 2-lb. polyethylene bags. The vegetables are individually frozen, allowing housewives to remove portions without having to break up solid-frozen packages.

Supermarkets like the idea of a bigger package, claim it boosts the amount of product sold. Test-marketing of big plastic packages is due to begin in the East this month.

• Growth for garment wraps: One other major use for the film is garment wraps — e.g., for drycleaning shops and laundries. This use consumed about 40 million lbs. last year. The consensus is that by '63 consumption for this application will have reached 50 million lbs./year. More than half of the laundry and drycleaning establishments in the U.S. already use PE film for wrapping garments; further inroads are not likely to be large.

Straw in the Wind: Spotless Stores, Inc. (Paterson, N.J.)—biggest laundry and drycleaning chain in the U.S.—has switched back to cellophane for wrapping shirts. It will continue to use polyethylene for drycleaned clothing, however.

Says part-owner Irwin Benburg, "Cellophane gives better gloss, is more transparent, makes shirts look whiter." "Also," Benburg continues, "we use air to open up the sacks before shirts are dropped in. This works fine with cellophane, but static electricity makes polyethylene ends hard to separate."

So far, Spotless is the only chain to report this. The tough — and less expensive — polyethylene film has won over most other launderers.

Cellophane Growing: Cellophane usage continues to grow. Du Pont predicts a 480-million-lbs./year market by '63, 550 million lbs./year by '68.

And the baked goods market, prime target of polyethylene and other film makers, is still the fastest-growing cellophane outlet. Cellophane sales to bakers climbed 12% last year. About one-third of all white bread is now packaged in cellophane, as are virtually all types of specialty breads.

Moreover, consumption of Du Pont's polymer-coated K cellophane jumped 75% last year, seems headed for continued growth in '59. This film is coated with polyvinylidene chloride, instead of the nitrocellulose lacquer that has been standard since the first moisture-resistant cellophane was developed in '27.

Whether this growth pattern will hold up under competitive pressure from polyethylene and other films is difficult to say. Largely because of cost, cellophane makers had difficulty getting the big baking firms to favor their product over waxed paper.

Cellophane salesmen concentrated on the smaller, specialty bakers to whom wrap cost is not as large a percentage of profit margins. Result: sales of specialty baked goods shot up, snagging profits from the big-volume items — and proving the worth of transparent packages. The big bakers were forced to switch to cellophane.

Now, say polyethylene makers, the larger bakers are showing a real interest in PE film because of its lower cost (polyethylene, 53¢/lb; cellophane, 62¢/lb.). If the big bakers

switch to PE, the smaller ones may be compelled to go along.

Clarity Contest: Despite progress in defogging PE, cellophane maintains a clarity advantage. On this score, however, casual observers often can't find much difference between the two.

One film that can match cellophane in clarity is polypropylene. Researchers of Hercules Powder — still the sole U.S. producer—report that transparency tests show even greater clarity for polypropylene film than for cellophane. They also claim greater sparkle, toughness, heat resistance for their product.

Hercules' Paul Johnstone says polypropylene sales last month were 10-fold greater than in April '58. "We're now selling truckload lots, instead of 1,000-lb. samples, as was the case last year. We expect to install five times our present capacity within the next few years." Hercules is looking for 50-100-million-lbs./year U.S. polypropylene demand by '63.

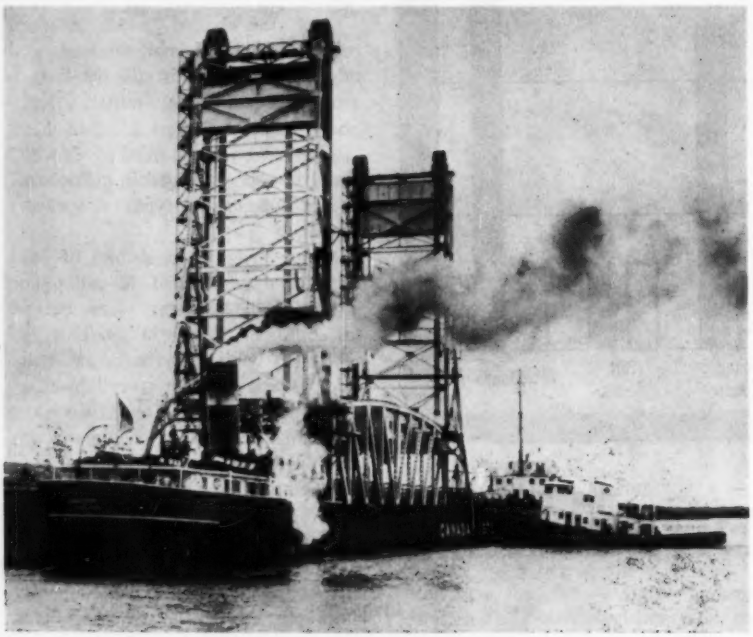
Other film contenders include polyvinylidene chloride, cellulose acetate, butyrate, vinyls, Pliofilm, oriented polystyrene, linear polyethylene, Mylar, polycarbonate and nylon. Biggest, in present volume, are probably Pliofilm, polyvinylidene chloride, acetate. The others may gain sharply in the next few years in uses in which weatherability, grease resistance, etc., can offset higher costs.

Du Pont, for example, obviously has big plans for its Mylar film. Although sales so far are believed to be in the 7-10-million-lbs./year range, the new $20-million plant will double production capacity. And, though Du Pont is the only current producer, at least two other big firms are weighing entry into the polyester film business.

Machine Factor: Spurring this growth is the development of new high-speed machinery for handling almost any kind of plastic film. One small producer will soon make available a machine that will cast and wrap polyethylene at the rate of 400-500 ft./minute. This is more than double the operating rate of machines currently in use. Moreover, there are strong hints that even faster rates have been achieved in preliminary tests.

Also becoming available are packaging machines that can handle nearly all films — as well as waxed paper. Package Machine Co. (East Longmeadow, Mass.) is already offering such a machine for bread wrapping. American Machine and Foundry and others have models in the final testing stages. And all will probably offer attachments for existing units.

Since big-volume users will realize substantial savings from use of the new machines in cooperation with plastic wrapping, there's little doubt that plastic film sales will benefit.



WIDE WORLD

First Seaway Traffic Jam

The newly opened St. Lawrence Seaway had its first mishap, and a temporary traffic jam, last week. The lake freighter *Prescott* — trying to avoid hitting a stalled lift bridge (40 miles upstream from Montreal) ran aground. Elsewhere on the Seaway, traffic moved on schedule. The 353-ft. Dutch freighter *Prins Johan Willem Frisco*, the first seagoing ship to transit the new locks, made the Montreal-to-Chicago trip in a little more than four and a half days. Most of the Seaway's first-week cargo was grain, but at least one ship was hauling chemical material. The Norwegian tanker *Olav Ringdahl, Jr.*, carried Russian benzene bound for Lake Huron ports. At Montreal, 2,400 tons of this benzol was unloaded for transhipment to Sarnia, Ont., because river pilots feared the fully loaded tanker might not clear the 24½-ft. locks. The *Ringdahl* was slated to take the remaining 7,400 tons directly to Bay City, Mich.

Soybeans to Chemicals

One of the nation's largest soybean processors, A. E. Staley Mfg. Co. (Decatur, Ill.) is planning to move deeper into chemicals via merger with UBS Chemical Corp. (Cambridge, Mass.).

Staley already produces some chemicals; it has a pilot plant and a semiworks polymer unit in Decatur, and last January broke ground for a research center.

Merger with UBS would broaden Staley's line. UBS products include styrene and acrylate emulsions and chemicals for wax and processing leather, fabrics, rubber and other materials.

The merger is expected to be completed this summer if stockholders of both companies approve. One share of Staley common stock would be exchanged for 1¾ shares of UBS common. Staley's sales for fiscal '58: $156.9 million. UBS '58 sales: $4.7 million.

Delayed Upturn for CPI's Builders

Rising sales and earnings, and an increasing proportion of foreign sales are earmarks of today's equipment, instrument and engineering business. Just last week came another example of how these companies are stepping up their foreign activities.

The Fluor Corp. (Los Angeles) has purchased majority interest in a Dutch engineering firm and is setting up a new subsidiary in the Netherlands. Object: to serve the European "Common Market" area. Fluor already has a subsidiary in Britain: Fluor Engineering & Construction Co., Ltd. (London).

And Foster Wheeler—whose backlog had shrunk by about 28% during the recession period—reveals that with the business trend now reversed, its unfilled orders as of March 11 were divided nearly 50-50 between U.S. and foreign projects: $114 million domestic, $112 million foreign.

Lag on Volume: In general, the equipment, instrument and engineering companies are riding the same upward business trend that has been bringing record sales and earnings to chemical concerns (*CW, May 2, p. 21*). But there's a difference: for the equipment and engineering firms, the uplift isn't yet as pronounced as it is for the CPI companies.

But the outlook for the rest of the year is good for both groups. Both McGraw-Hill and government surveys have shown that an upturn in capital spending is well under way; and, says McGraw - Hill's Economics Dept., "such an upturn, once begun, usually gathers strength and continues for at least two years."

New Orders: M. W. Kellogg (division of Pullman) has been getting new orders at a rate substantially exceeding current billings. Stone & Webster reports a nearly 19% rise in "unbilled charges under contract."

In last week's transaction, Fluor acquired a 75% interest in N.V. Ingenieursbureau voor Chemische en Physische Techniek, Ph. J. Schuytvlot en Zoon. This 14-year-old firm normally has performed only engineering and drafting services. The new subsidiary —Fluor-Schuytvlot, N.V.—will offer "complete process and mechanical design, procurement and construction services."

Equipment, Instrument, Engineering Companies

	Sales 1st qtr. '59	Change, 1st qtr. '58	Earnings 1st qtr. '59	Change, 1st qtr. '58	Margin 1st qtr. '59
Amer. Mach. & Metals	11.7	6.6%	0.7	31.1%	6.3%
Babcock & Wilcox	77.9	—15.9%	4.5	124.0%	5.8%
Blaw-Knox	45.4	18.8%	2.2	34.0%	4.8%
Combustion Engineering	81.3	9.5%	1.9	15.8%	2.3%
Consol. Electrodynamics	10.2	46.6%	0.2(1)	——	2.0%
Fairbanks, Morse	20.3	—14.3%	0.1(2)	450.4%	5.9%
Fluor Corp.(3)	28.9	—5.5%	0.03	—91.8%	1.1%
Foster Wheeler	31.0	—37.7%	0.5	—54.4%	1.7%
Garrett Corp.	49.4	21.5%	1.2	21.6%	2.5%
General Controls	9.7	25.6%	0.5	114.8%	4.8%
Hagan Chem. & Controls	6.8	7.5%	0.3	9.6%	3.8%
Int'l. Business Mach.	295.6	10.5%	29.0	23.8%	9.8%
Joy Manufacturing	23.0	—2.0%	1.2	—10.5%	5.1%
Link-Belt Co.	36.9	2.9%	1.5	12.3%	4.1%
Pullman, Inc.	90.7	14.1%	1.1(1)	—60.7%	1.3%
Stone & Webster Engrg.	(N.R.)	——	2.3	11.0%	——
Texas Instruments	30.0	46.4%	2.4	116.4%	8.0%
Thompson-Ramo-Wooldridge	91.3	5.1%	2.2	9.7%	2.4%
Worthington Corp.	41.5	—6.6%	1.8	—16.2%	4.3%

Chemical, Pharmaceutical, Specialty Companies

	Sales 1st qtr. '59	Change, 1st qtr. '58	Earnings 1st qtr. '59	Change, 1st qtr. '58	Margin 1st qtr. '59
Amer. Agric. Chem.(4)	(N.R.)	——	1.0	16.8%	——
Amer. Potash & Chem.	12.7	10.1%	1.1	3.1%	8.8%
Atlas Powder	16.0	5.3%	0.7	30.1%	4.3%
Carborundum	27.7	22.1%	1.8	292.2%	6.4%
Colgate-Palmolive	141.6	10.4%	5.0	13.3%	3.5%
Columbian Carbon	18.6	14.7%	2.0	72.7%	10.5%
Cutler Laboratories	4.7	6.0%	0.2	9.9%	4.2%
Detrex Chemical	4.2	11.0%	0.2	69.4%	5.8%
Duval Sulphur & Potash	3.7	6.4%	0.6	—28.6%	16.8%
Eastman Kodak(5)	189.9	15.4%	22.8	54.1%	12.0%
Kaiser Alum. & Chem.	91.7	—8.1%	3.5	—45.8%	3.8%
Lehn & Fink	8.1	11.1%	0.3	8.1%	3.8%
Mead, Johnson & Co.	17.6	12.3%	1.5	9.8%	8.6%
Nalco Chemical(6)	11.8	38.5%	1.0	53.9%	8.8%
Pittsburgh Plate Glass	110.3	—6.0%	3.7	—26.4%	3.4%
Procter & Gamble	(N.R.)	——	19.8	0.5%	——
Searle, G. D.	8.0	5.9%	1.7	0.1%	21.4%
Spencer Chemical	12.5	31.9%	0.9	39.3%	6.8%
Sun Chemical	12.5	9.3%	0.2	101.2%	1.5%
Warner-Lambert	43.4	5.5%	3.4	2.2%	7.9%

(1) Excluding profits on sale of securities. (2) 1959 quarter data include results for all subsidiaries; figures for '58 quarter do not include results for two subsidiaries now consolidated. (3) Results for three months ended Jan. 31. (4) Results for nine months ended March 31. (5) Results for 12 weeks ended March 22. (6) Formerly National Aluminate Corp.

Round-the-clock efforts ready IPE's Tulsa display for 500,000 visitors.

Spotlight on Petrochemicals

Petrochemicals will get the spotlight in the petroleum industry's two big get-togethers of this year — the International Petroleum Exposition (May 14-23, in Tulsa) and the Fifth World Petroleum Congress (June 1-5, in New York).

In Tulsa, more than 500,000 persons are expected at IPE's permanent 30-acre exposition grounds. A major feature of the exposition will be the Hall of Science, which will tell the story of the industry's progress. It will be subdivided into seven units, including a petrochemicals division with 75 integrated exhibits, set up by about 25 petroleum and chemical companies. Keyed to the themes of the industry's rapid growth and contributions, it will show how petrochemicals are made, who helps make them, and the ways they are used in other industries and to promote better living standards.

The 1,800 companies displaying their wares or telling the industry's story are spending some $15 million on their exhibits, which will include a replica of Colonel Edwin Drake's first oil well (to commemorate the 100th anniversary of Drake's strike), modern rigs, oil field equipment, a scaled-down offshore rig, an automatic pumping station, radioactive trace materials and plastic pipe.

While there will be many exhibits of interest to the "man in the street," most of the exhibitors will aim at impressing the estimated 30,000 petroleum men, including 2,000 from other countries throughout the world who are expected to attend.

New York, Too: Many of the Tulsa exposition's industry visitors will also take in the World Petroleum Congress Exposition in New York city's Coliseum, where they'll find some of the same exhibits they saw in Tulsa, along with new displays.

Some 200 exhibits will occupy two floors of the Coliseum, while two other floors will accommodate the technical sessions of the congress, being held in the U.S. for the first time.

More than a dozen chemical companies will exhibit, featuring chemicals used by the petroleum industry, including corrosion inhibitors, bactericides, catalysts, blasting agents, plastic pipe and linings, weed killers. A German group will show models of new electrolytic chlorine, heavy-water and acetylene plants.

Unlike the Tulsa show, the congress will not be open to the public, but attendance is expected to be 20,000, including 6,000 delegates and 1,700 visitors from nearly 50 foreign countries. The Soviet Union, as a protest against State Dept. travel restrictions, canceled plans to send a scientific delegation.

Oxide Boost for Europe

The new ethylene oxide capacity now surging onstream in Europe is one of the major contributors to the buildup that will triple petrochemical output between '57 and '60.

Plants newly onstream and those soon coming in will bring western Europe's ethylene oxide capacity to more than 215,000 metric tons/year. They assure a steady supply of raw material for manufacture of a broad variety of derivatives.

During the past two or three months alone, three ethylene oxide plants came in with a total annual capacity of 32,000 metric tons. In Belgium, Societe Chimique des Derives du Petrole (Antwerp) went onstream in March with a capacity of 4,000 tons. In Germany, Chemische Fabrik Holten — subsidiary of Badische Anilin- & Soda-Fabrik, Ruhrchemie Aktiengesellschaft and Th. Goldschmidt — brought a 10,000-tons/year plant into operation in Ludwigshafen; and Erdoelchemie — joint venture of Farbenfabriken Bayer and British Petroleum Co. — started up its 18,000-tons/year plant.

All were engineered and licensed by Scientific Design, which is working on still another ethylene project—a doubling (by '60) of Naphtachimie's 15,000-tons/year Lavera (France) plant. Holten's plant is also reported being doubled, and Societe Chimique will have another 4,000-tons/year plant running next month; Erdoelchemie's capacity will be doubled to 36,000 by early next year.

Still more plants will be in operation this month: Montecatini is putting the finishing touches on its 10,000-tons/year unit at Ferrara; and Marles-Kuhlmann will have a 15,000-tons/year facility in operation at Gonfreville, France.

Other projects in the works: S.p.A. Celene, the joint venture of Union Carbide and Societa Edison, plans a 12,000-tons/year plant for '60, when Carbide's Fawley (England) unit will be set to make 20,000 tons/year.

Also in England, Imperial Chemical Industries is expanding its Wilton plant from 18,000 to an estimated 22,000 tons; and Shell is building a 25,000-tons/year unit. Shell already has a 25,000-tons/year facility at Carrington, but it's being converted for partial propylene oxide output.

COMPANIES

B. F. Goodrich Co. and High Voltage Engineering Corp. (Burlington, Mass.) have set up Goodrich-High Voltage Astronautics, Inc., to research, develop and produce ion-propulsion engines for space flight. Headquarters will be at High Voltage's Burlington plant. Goodrich has been active in space technology through its Aviation Products Division; High Voltage makes ion accelerators. President of the joint venture will be A. John Gale, vice-president and director of applied physics at High Voltage. P. W. Perdriau, general manager of Goodrich's Aviation Division, will be chairman of the board.

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Stauffer Chemical Co. has split its common stock two for one and upped its quarterly dividend the equivalent of 2½¢/share.

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Progressive Color and Chemical Co. and The Uhde Corp., affiliates of Farbwerke Hoechst, have changed names. Progressive, a distributor for Hoechst products in the U.S., will be called Hostachem Corp. Uhde's new name: Hoechst-Uhde Corp. It offers Hoechst processes.

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The Flintkote Co. will buy the assets of Glens Falls Portland Cement Co., if Glens Falls stockholders approve, for 369,858 shares of its common stock. Glens Falls owns a 1.8-million-bbls./year cement plant in Glens Falls, N.Y. It wrote $5.2 million in sales last year. Flintkote's '58 sales: $156.2 million.

EXPANSION

Acrylic Emulsion: Rohm & Haas Co. of Canada has completed engineering an acrylic emulsion plant at West Hill, Ont., to add to existing facilities there. The new capacity is due in production in midsummer.

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Aluminum: Kaiser is opening a third potline at its Ravenswood, W. Va., plant, to increase the plant's output to 108,750 tons/year of primary aluminum. A fourth line is near completion.

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Cement: Permanente Cement Co. will build a $12-million cement plant in the Waianae area of Oahu, Hawaii. Capacity: 1.7 million tons/year. Construction will start within five months; the plant is due in full production by Aug. '60. Permanente is also expanding its Honolulu distribution plant 43%, boosting storage capacity to 125,000 bbls. Raw material for the new plant will be coral. Another $12-million cement plant has been proposed in Hawaii by the newly formed Hawaiian Cement Corp. Capacity: 1 million bbls./year.

•

Sulfuric Acid: North Star Chemicals, Inc., is putting up a 240-tons/day sulfuric acid plant at Pine Bend, Minn. (near St. Paul). It's due onstream in the last quarter of '59, will reportedly be the only sulfuric plant in the state, although one has been proposed for Hastings, Minn. Titlestad Corp. (New York) supplied the plant and engineering.

And at Sulphurdale, in western Utah, a group of investors plan to erect a 200-300-tons/day sulfuric acid plant, drawing on local rock sulfur deposits.

•

Polyethylene: Texas Eastman and Allied Chemical are both boosting their polyethylene capacity. At its Longview, Tex., plant, Texas Eastman is expanding capacity from 85 to 100 million lbs./year. And Allied's Semet-Solvay Division will soon install equipment at its Tonawanda, N.Y., plant to up capacity 50%, to 30 million lbs. (*CW Business Newsletter, May 2*).

FOREIGN

Synthetic Fibers/Europe: Du Pont has set up a new department within its Geneva-based international subsidiary to handle synthetic fiber sales in Europe. The new unit handles advertising, distributor relations and technical service. Similar organizations are to be formed for other Du Pont departments.

•

Equipment Purchases/Russia: Russia's chemical equipment shopping surge is spurring competition among European producers. Latest contract: a $6.16-million deal for a synthetic fiber plant, awarded to England's Vickers-Armstrongs and Highpolymer and Petrochemical Engineering after intense bidding by other companies, including Krupp.

Krupp already has a contract for a $12-million synthetic fiber complex, due to be in full operation next year. One plant is going up at a new Soviet oil center 750 miles from Moscow; another (to produce dimethylterephthalate) is being erected at a chemical center 185 miles from Moscow, and the fiber plant is being built in a textile combine 500 miles from Moscow.

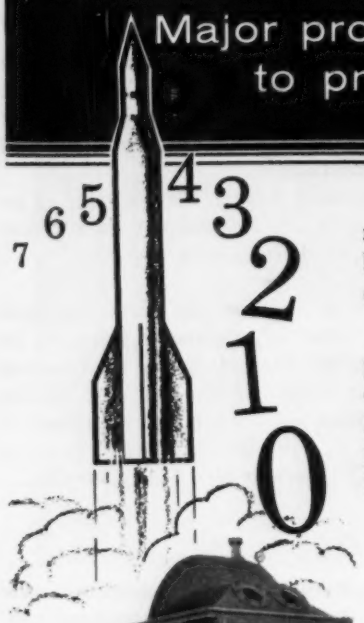
•

Heavy Water/Germany: The German Atomics Ministry has ordered a 0.5-tons/year heavy-water plant from Pintsch-Bamag. It will start up early next year alongside the 6-tons/year plant of Farbwerke Hoechst's subsidiary, Knapsack - Griesheim (near Frankfort). If test runs are successful, the new plant will be expanded to commercial size. It will use an ion-exchange process first used by I.G. Farben's Leuna plant in East Germany.

•

Industrial Gases/India: Indian Oxygen Ltd., subsidiary of British Oxygen Co., has raised $950,000 (foreign exchange) from the Indian Industrial Credit & Investment Corp. and $630,000 from the Commonwealth Development Finance Co. (London). The company is a major producer of oxygen and acetylene, and is building new plants due onstream in '60.

Major producers count on **DAY** equipment to process solid propellant fuels



DAY builds equipment specifically designed to meet the exacting requirements for processing solid propellant fuels. The machine types shown here have been specified by major producers of solid fuels for their safe and efficient operation, ruggedness and thorough dependability.

Investigate the many proven advantages of DAY equipment for your processing work. You'll receive every benefit that more than 70 years of experience in building a variety of processing machinery can bring, plus DAY'S matchless reputation for reliability and service. Write for detailed information on DAY equipment to meet your requirements, or call in a J. H. Day Company field engineer.

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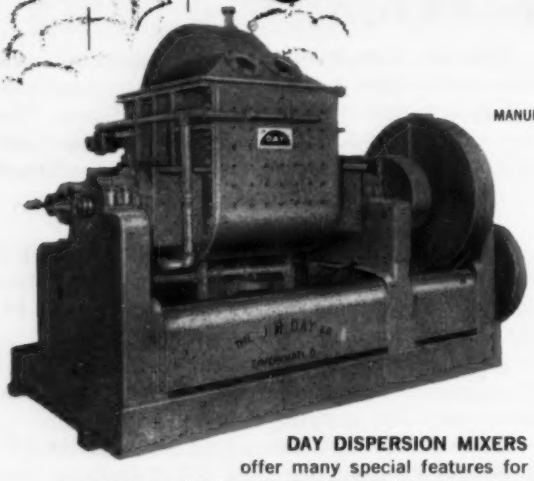
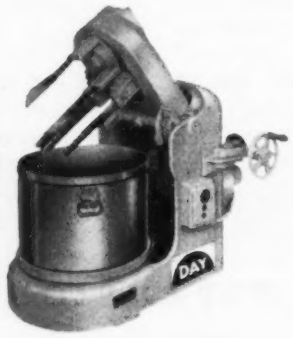
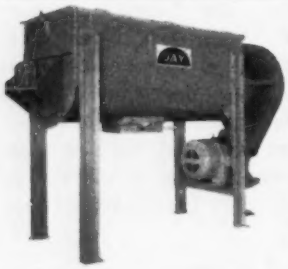


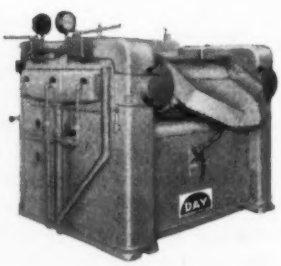
DAY DISPERSION MIXERS offer many special features for processing solid propellants: Jacketed stainless steel tank; close temperature control; many safety features; provision for vacuum mixing; equipped for remote operation. Available in a complete range of laboratory and production sizes, ¼—300 gal. capacities, ¾ to 150 h.p. drives. Write for Bulletin 1157.



DAY PONY MIXERS twin or single motion, provide fast, thorough mixing of curing agents and high performance fuel additives Whatever your requirements, there's a DAY Pony Mixer specifically designed to do the job. Write for Bulletin 500.

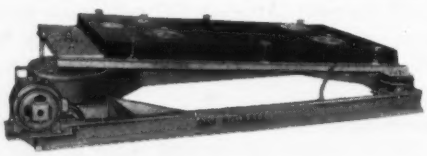


DAY RIBBON BLENDERS provide fast, pre-blending of oxidizer grain sizes prior to final dispersion mixing of the composite fuel. Built in a wide range of rugged tank sizes and designs, with various types of agitators. Write for Bulletin 800.



DAY 3-ROLL MILLS produce fine dispersions of fuel curing agents that were previously blended in DAY Pony Mixers. DAY Mills are built in 10" x 22" and 14" x 30" sizes for production quantities; in 5" x 12" and 4" x 8" sizes for pilot operations. Write for Bulletin 158.

DAY RO-BALL GYRATING SCREENS use super-active ball cleaning principle to sift foreign materials from oxidizers and additives; to obtain selected grain sizes for burning rate control. Many models are available to provide from two to five separations, with choice of discharge designs. Write for Bulletin 957.



Washington
Newsletter

CHEMICAL WEEK
May 9, 1959

Congress is wrestling with a whole raft of proposals important to the chemical industry—but isn't getting far this year.

The apparent resurgence of New Dealism that came out of last fall's elections has subsided. Talk about preparing and passing an unmistakably Democratic program—regardless of Eisenhower's wishes—has completely disappeared. The last fragment of this was dissipated when the Democratic leadership failed to override Eisenhower's veto of the law that would have divested Agriculture Secretary Benson of some of his power over Rural Electrification Administration loans.

This means that the details of chemical industry bills will be threshed out in compromises between the White House and Congress. It also means that more legislation than expected earlier will be held over until next year—when election pressures take charge.

Here's the outlook on several key issues:

Color additives—good chance of passage this year of Administration's bill to permit the Food & Drug Administration to set tolerances for colors; the bill will likely be introduced before end of the month.

Chemical labeling—hearings will be held on one proposal to give FDA authority to regulate labeling of hazardous household products, and another to regulate agricultural chemicals under the same law as insecticides. Prospects for approval of both look good.

Atomic patents—hearings to resume this month. Odds favor renewal of the present law for another five years.

Saline water—Congress will keep giving financial backing to the present program.

Medical research—Congress is almost certain to boost Eisenhower's request for funds. House committee added $50 million to Eisenhower's request for $294 million for the National Institutes of Health.

Alien property—hearings may be held this month but no proposals on General Aniline & Film will get consideration while the Swiss court action ties things up.

Antitrust—proposal requiring merging companies to notify government ahead of time has almost no chance of coming to a vote this year. The same holds for S. 11, the bill dealing with "good faith" as a defense against price discrimination charges under the Robinson-Patman Act; and for a bill giving antitrusters the right to subpoena company documents.

"Fair trade"—House may pass a law, but there's little likelihood that a bill will be sent to the White House.

Price notification—measure requiring certain industries to give

Washington Newsletter

(Continued)

government 60 days' notice on price increases won't pass the Congress.

Foreign investment incentives—tax concessions for overseas investors will be backed by the Administration; chances of passing this year have improved.

Commodity subsidies—it's not likely that quota protection to fluorspar producers and other measures to protect other domestic minerals will clear Congress.

Labor regulation—Senate version of law regulating unions and union leaders has big hurdle in House Labor Committee. If a bill finally goes to White House, it's likely to be slightly tougher version of the Kennedy bill the Senate finally passed. It covers financial reporting, union democracy, slight curbs on picketing and boycotts, bans on ex-convicts holding office.

Air pollution—House has already approved four-year extension of the Pollution Control Act, boosting federal outlays from present $5 million/year to $7.5 million. Something like this is sure to be passed.

Water pollution—the issue is pushing present $50 million/year construction program to $100 million/year as proposed by Rep. John Blatnik (D., Minn.)—or dropping federal aid altogether, as Eisenhower wants. Odds favor continuation at present level.

Food & Drug Administration—House has approved $13.8-million for FDA next year—the amount FDA wanted—but $2 million more than the White House would let it ask Congress for. The increase is more probable.

Atomic power expansion—key Democratic lawmakers want to double the $75-million/year reactor construction program recommended by the Atomic Energy Commission. Some increase is likely.

•

The government will go after experienced research scientists with a new recruiting process eliminating written tests and emphasizing personal evaluation of research and development accomplishments. The new Civil Service Commission chairman, career government man Roger W. Jones, says he will try the new method first in recruiting for Washington labs and expand it later if it's successful.

The government has had unusual success in the past year attracting lower- and medium-level scientists. A 10% pay raise last June, better starting offers for superior college seniors ($5,430 for scientists and engineers with B.A.'s, $6,285 with M.A.'s) and ability to offer special premiums in shortage categories, such as electronics engineers, have helped considerably. "Two years ago, we were after people; now we're after quality," says a personnel man.

The rate of acceptance of government job offers for scientists rose from about 12% in '56 to 50% in recession year '58.

If you can't see four airplanes, lift the flap

In one year there were nine mid-air collisions among 1600 training aircraft of the Air Force's Air Training Command. Student pilots did not see each other in time to avoid a collision. In a program to prevent this type of accident, the Air Training Command, which flys one-third of the total Air Force hours each year, pioneered in the use of fluorescent painting of aircraft.

The following year, there were only two mid-air collisions, neither one involving fluorescent painted aircraft. A major factor in this drastic reduction was the application of coatings that fluoresce.

It is generally believed that all strongly fluorescent organic materials have a molecular structure which, when excited by outside sources of energy, emit light. The emitted light is always of a lower energy level (longer wave length) than the exciting light. For example, irradiation with "bluish" light can produce "reddish fluorescence". An important fluorescent pigment contains a form of rhodamine, derived from benzene and naphthalene. Toluene sulfonamide, derived from toluene, is a vital constituent of this resinous pigment matrix. The extending of coatings made with this matrix is accomplished by using toluene and xylene.

United States Steel is a producer of phenol, naphthalene, toluene, and xylene, as well as a full line of high-quality coal chemicals. For more information, a USS Chemical Product Catalog is available for the asking. Write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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Chemical	938	408
Soap & Bleach	1,128	362
Rubber, Plastics	600	248
Textile (incl. Rayon)	280	96
Glass & Ceramic	142	51
Paper	703	268
Drug	239	116
Paint	1,153	321
Food	305	83
Total	5,488	1,953

HERE'S THE SUMMARY BOX SCORE...

Catalogs and Directories (Base or 100% = 1,953)	Use Regularly & Occasionally	Use Regularly
Chemical Week Buyers' Guide	1,203	692
Thomas' Register	969	508
O.P.D. Buyers Directory (Green Book)	846	495
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FOUR FACTORS BOOST SALES OF HOUSEHOLD DYES

1 Increased use by the young, middle-income housewife

2 The ease of machine dyeing

3 Convenience packaging of dyes in one-shot packages

4 More dyeing of bulky items —rugs, drapes, slipcovers

New Sell for 'Do-It-Yourself' Dyeing

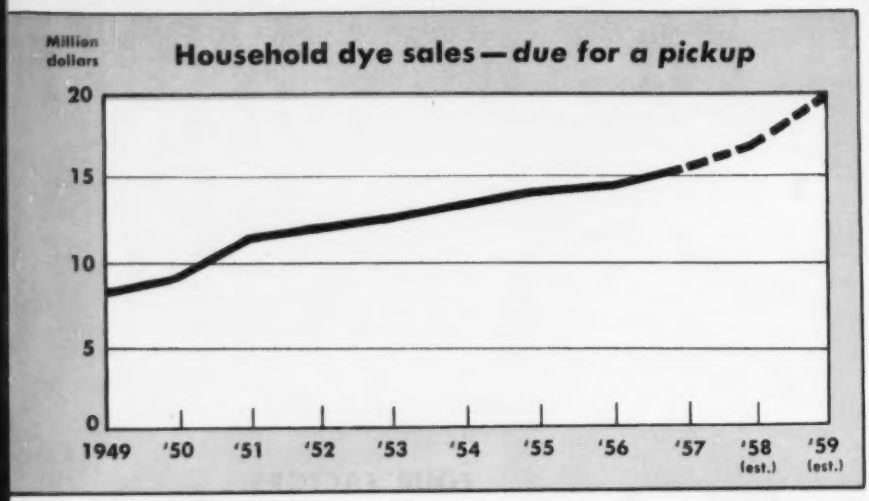
The household dye business has entered the machine age. The automatic washing machine has helped transform what was a business steadily growing at 3-4%/year into one climbing 10% yearly. Instead of emphasizing that dyes make clothes last longer, the dyemaker is urging the housewife to "coordinate her home furnishings"—dye drapes, rugs, upholstery. Result: sales will likely climb this year from $17 million (*CW* estimate) to around $20 million in '59.

The washing machine has helped sales of household dyes for several reasons. First, washing machines permit larger articles (drapes, shag rugs) to be dyed,* and these require more dye per job. Moreover, the simplicity of dyeing in a washer—no big boiling kettle and stove is now necessary to dye bulky items—has encouraged many more women to try it. Machines have also helped bring home dyes to a new group of customers, the middle class and upper class, and made dyeing a job the city family—even more than farm and small town families—does regularly.

And machines will likely do still more for the household coloring business. Makers of washing machines have begun promoting their machines for that use, are spending advertising money in a way dye makers could never afford by themselves. General Motors has run full-color ads showing how its Frigidaire washers allow automatic dispensing of dyes. And many of the other washer makers will feature this in their future promotion.

These new ads stress the foolproof dyeing results the housewife can get by using a machine—an important point, because fear of failure has prevented many women from attempting dyeing. There's an additional, more positive

*There's some argument about the distinction between tinting and dyeing. In general, tinting is coloring of items in hot tap water—result is usually a light color. Dyeing requires higher temperatures, generally refers to coloring materials darker shades.



Source: Food Topics (figures up to 1957).

point in ads by machine makers—the element of approval. There's not the stigma attached to machine-dyeing a shag rug that there is to dyeing a dress to make it last longer. A woman, as a rule, will boast of her success with the former, try to keep the latter a secret.

Who's In It: The household dye market has been supplied mainly by two companies: Park & Tilford with its line of Tintex dyes (47 colors) and Best Foods Division of Corn Products with Rit Dyes (35 colors). These two probably share more than 90% of the entire market (up from 80% in '53; 60% in the '30s). Each claims that it's the top seller in the field—Best Foods asserting it somewhat more vigorously—but neither will disclose yearly sales. *CW* estimate: something like $5-6 million each.† P&T turns out Tintex in a single plant in New York City. Best Foods manufactures Rit in Indianapolis.

Besides Best Foods and Park & Tilford there are perhaps a half dozen companies that turn out household dyes. But aside from Monroe Chemical Co. (Quincy, Ill.), which puts out Putnam dyes in 41 colors at 20¢/-package, there's little serious national competition for the top two. Some firms such as Diamond Chemical Co. (San Francisco) have made a profitable business of selling dyes for special applications, such as rugs, upholstery and drapes; but these, strictly speaking, are not household dyes. Diamond, for instance, sells its Thur-O Color-Back cold-water dyes, not to the housewife, but to professional cleaners.

But the future might see some competition for the top two—especially if the sales curve for household dyes continues to climb at its present 10%/year pace.

For instance, it's not beyond the realm of possibility that Plough Inc. (Memphis, Tenn.) might have something bigger in mind than coloring eggs in its recent acquisition of Paas Inc. (Newark), maker of Easter egg dyes. And one of the big door-to-door sellers is said to be looking into the household dyes—they are the sort of products that lend themselves to that kind of personalized merchandising.

Food Store Push: If the dyes are sold house-to-house, it will be the third important change in selling techniques in 30 years. When first introduced, dyes were mainly sold in drugstores. Then, during the '20s and '30s, the variety and chain stores became important market outlets. The food store at that time was a negligible factor (5% of sales). Now, though drug and chain stores are still the biggest outlets, the food stores are growing fastest.

And that outlet will grow faster if the dye makers can convince food marketers that the heavy push for machine dyeing entitles dyes to a share of the laundry goods shelf. One dye industry spokesman thinks grocery sales may account for 50% of sales within five years.

Food store outlets have proved particularly good sales points for recently introduced "giant size" dye packets. P & T has a line of 12 colors that it markets in an 8-oz. package designed especially for washing machines, and it's pushing this especially hard in the grocery outlets. Best Foods retails its top-selling 25 colors to the grocery field on racks holding half-dozen of each item. It says the racks are an important merchandising feature, that they can double or even quadruple sales.

Paint Stores Too: With more housewives dyeing their home furnishings, paint stores and department store paint sections may take a rising share of dye sales. Rationale: the householder will want to match room paints with dyes for drapes, upholstery, etc.

Another outlet that might grow in the future is the automatic laundry. P & T is pushing this approach harder than is Best Foods. It sells Tintex and also a bulk product, tradenamed Pro-Dyes, to the laundry operator. These are sold in bulk packages of 1, 2, 5 and 10-lb. packages. Cal Dyes (Los Angeles) also is selling bulk dyes to the laundry operator, as is Diamond Dyes, but neither of these has a line of consumer products.

Small Sizes Going: Price changes are coming with increased dye sales. The 15¢ package of household dye will probably be dropped soon. Best Foods has standardized on a 25¢ package and P & T will probably drop it's 15¢ and 20¢ sizes. Best Foods, however, claims it has no plans to go to the large, 8-oz. package for washing machines as P & T has done.

Monroe Chemical has been selling its Putman dyes in polyvinyl alcohol packages that dissolve along with the dyes, but neither Best Foods nor P&T seems likely to adopt this type of packaging.

Mixers, Not Makers: Though some household dyes are put together by the basic dyestuffs manufacturers such as American Cyanamid, and are merely repackaged for sale, the large majority of household dyes have additives—wetting agents and levelers—mixed into them by the household dye maker.

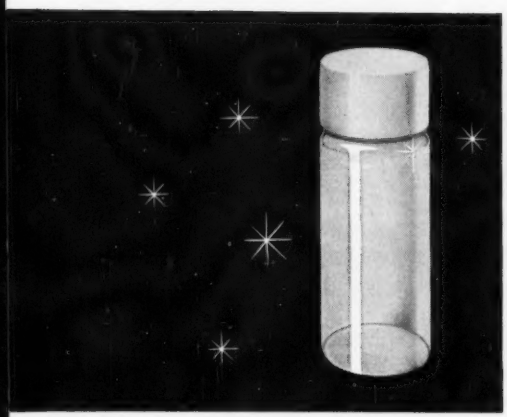
Household dye formulations haven't changed much in recent years. A typical all-fabric type (95% of dyes are this type) usually contains a di-

†These figures include sales of predye color removers, which are also sold as nylon refresheners. These products are essentially sodium hydrosulfite bleach. P&T calls it's product Whitex; Best Foods tags its product Rit Color Remover.

A little

extra everything

. . . except price



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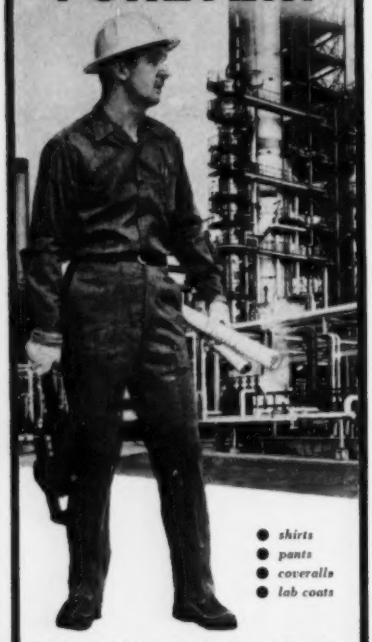
Famous WORKLON acid-resistant
INDUSTRIAL APPAREL
now "Astonized" to
END STATIC HAZARDS FOREVER!



- shirts
- pants
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rect dye for cotton, linen, viscose and silk; an acid dye for wool; and an acetate dye for nylon and acetate. It's not as simple as that, however; a direct dye has some dye value for wool, for instance—a factor formulators must take into account. The active dyeing matter for the household product usually is about 5-15%.

Black on Top: Currently, dark colors are most popular. Black is usually the top seller each year; now it takes about 10% of the entire market. Green is probably the second best seller now, with dark shades of red or blue also popular. Pink and yellow are currently the most popular of the light colors. According to a Rit spokesman, there is little change in popularity ranking of colors from year to year. Generally, the top 10 colors in a line of 30 to 40 colors account for about 40-50% of dye sales.

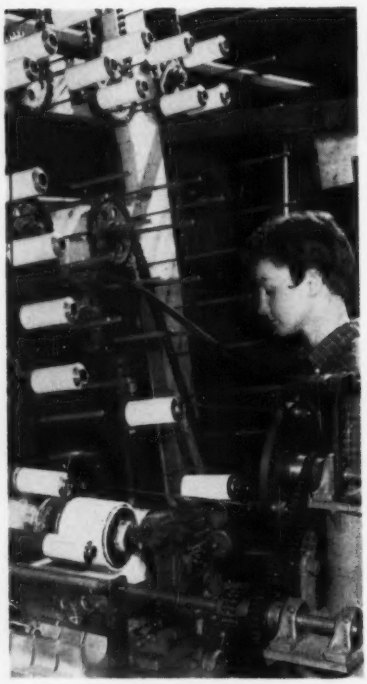
The increased use of synthetic fibers hasn't had a serious effect on the sale of household dyes, according to the dye makers. With the exception of glass and mineral fibers, the housewife can dye anything she can wash, they claim. Orlon, Dacron and Acrilan, however, do present dyeing problems. But colorant makers prefer not to emphasize this; they feel that the housewife is confused enough about fibers. And telling her she can't dye Orlon without special care might discourage her from attempting to dye acetate products.

Resin-treated, wash-and-wear items probably won't give dye formulators —or dye users—much to worry about, largely because the resins are generally washed out by the time a housewife is ready to dye. The newer laundry aids, such as fabric softeners and silicone antistain treatments, likely won't worry the dye sellers much either.

In those cases where home permanent solutions, or an excess of chlorine bleach, has been spilled on an item, there is sometimes trouble. Both of these can cause fiber deterioration, resulting in uneven dyeing—and complaints to the household dye maker.

No Legal Woes: The problems that have plagued other users of coal-tar dyes for consumer products, i.e., the cosmetic and food color users, probably won't be visited on household dye makers. *CW* found the Food & Drug Administration is not now concerned with household tints and dyes; the only reason it might become interested would be through a proposed household poisons law. And then, FDA would be checking labeling, probably wouldn't ever ban products.

Get the Outs In: The future of household dyes looks fine—if washing machine dyeing brings in new customers, as dye makers predict. Currently, only about 40% of the U.S. housewives ever use dye, and only about 25% are regarded as regular users. If manufacturers can make regular customers of the "unsold" 75%, it will mean a steeper upward turn in an already climbing sales curve.



New Cans Coming

American Can Co.'s Bradley-Sun division will soon be turning out a line of impact-extruded, seamless aluminum cans (*above*) for aerosol packages. First production, scheduled to begin late this year, will be restricted to 6-oz. units. The cans weigh about half as much as same-size tinplate units, are expected to find initial use in the packaging of cosmetics, pharmaceuticals and dentifrices. The experimental units shown here are on their way to overhead drying ovens, after getting a quick roll-on coat of white enamel.

Who Washes What?

A new market study on household cleaning supplies and equipment is now available to specialty makers.

The survey, conducted by *Good Housekeeping* magazine, gives specialty makers specific information on how women do various cleaning jobs, the types of products they use, and the particular brands they buy for each operation. And the study should also leave them with a pretty good idea of some trends in product usage, plus some helpful hints on market planning.

Here are some of the more interesting findings *Good Housekeeping* came up with in its study of 2,500 housewives, whose income, regional distribution and age ranged widely.

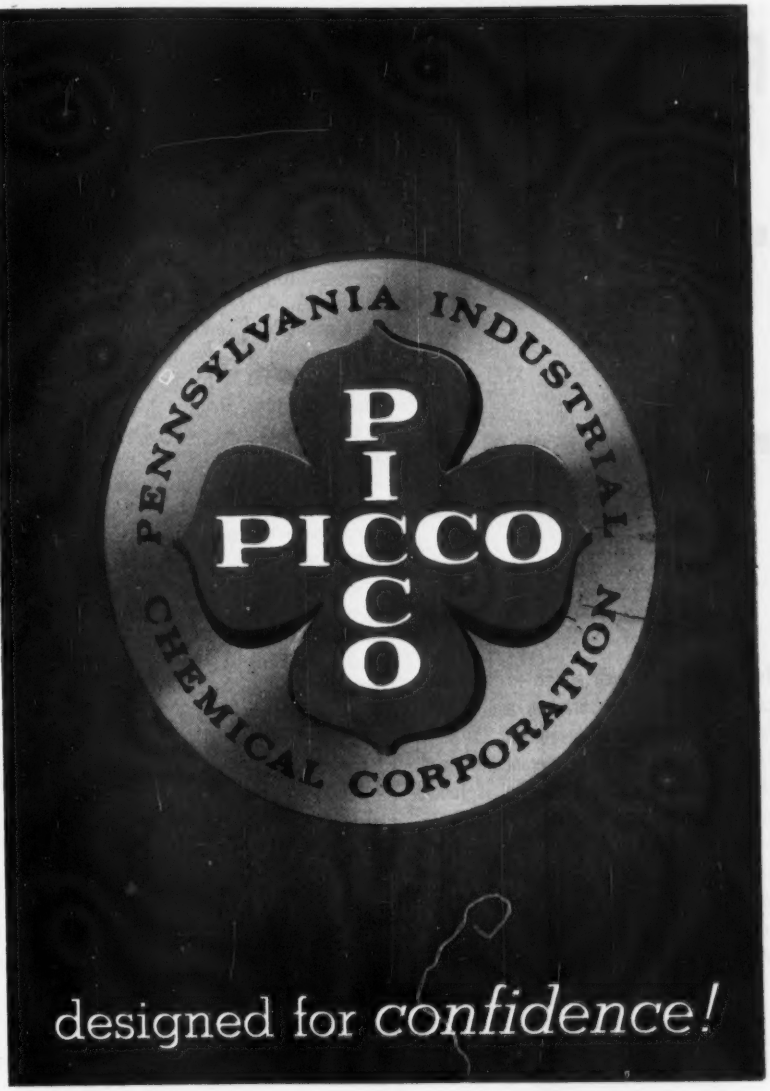
Dishwashing Detergents: Liquids were most popular for dishwashing—54% of *Good Housekeeping*'s respondents used them; 32% who used liquid bought Lux Liquid. Powdered syndets were used by 38% of the women interviewed; 26% of housewives using the powders favored Tide.

Laundry Supplies: For washing clothes, women preferred the dry detergents over the liquids—92% used granulated products, 31% flakes and 43% liquids. For heavy-duty fabrics, Wisk and Tide won brand preference; for fine fabrics, Lux was the most popular liquid, Tide the most popular granule, Ivory first among flakes.

Liquid bleaches were used by 88% of the women—61% of liquid users bought Clorox. Dry bleaches were used by 29%—40% of dry bleach users bought Purex's Beads of Bleach. Fabric softeners were used by 29% of the women questioned—42% bought Sta-Puf, 38%, Nu-Soft.

Rug Cleaners: Shampoo dispensers for carpets were owned by 61% of the women—38% had a Bissell shampoo unit, 11% had a Glamorene rug cleaning unit. In the rug cleaning field, 40% used liquids, 39% used dry rug cleaners. Glamorene was the top selling rug cleaner. Its dry form was used by 55% of the women who favored dry products, its liquid type by the 27% who preferred this sort.

Some other top-selling brandnames among *GH*'s survey sample were: oven cleaners—Easy-Off was used by 65% of the 70% of women who used oven cleaners; drain cleaners—Drano had 89% of the market among



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the 66% of women that used drain cleaners. Home drycleaning fluids: out of the 30% of women who used home drycleaners, Energine had 33% of the market. All-purpose liquid cleaners: 34% of the women used them—41% preferred Lestoil. Silver polish: it was used by 71% of the women interviewed; Wright's silver polish had 42% of this market.

Unfaithful Users: *Good Housekeeping*'s report points up the fact that when it comes to buying cleaning supplies, most women like to switch brands. In the dishwashing specialty field, 22% of respondents changed product brands within the last six months. Laundry specialties fared somewhat better in brand loyalty—only 13% of women switched brands here. Fastest growing new products included all-purpose liquid household cleaners (21% of respondents were using them who didn't six months ago), aerosol room deodorants (12% of women added these products to their cleaning supplies within the last six months), sink cleaners, copper and brass polishes (11% of women bought these items for the first time within the last six months).

Other products covered in the new report (available from *GH*) include floor finishes; auto waxes; copper cleaners; window, upholstery, leather cleaners; furniture polishes; room deodorants and a host of other cleaning specialties.

Epoxy Assist for Vinyls

Union Carbide has introduced two new epoxy-containing plasticizers for vinyl resins. The new compounds, Flexol plasticizers 107-D and 163-D, function both as plasticizers and as vinyl chloride stabilizers. Compound 107-D, chemically di(2-ethyl-hexyl)-4, 5-epoxy tetrahydrophthalate, is similar n plasticizing properties to dioctyl phthalate, except that the epoxy group s said to make it less volatile, provide stronger solvating power.

Plasticizer 163-D, which will be commercially available in a few months, is chemically di(iso-decyl)-4, 5-epoxy tetrahydrophthalate; it is similar to the conventionally used di(iso-decyl)phthalate.

Both plasticizers are designed for use in vinyls subjected to considerable weathering, according to UCC. They are suggested for use in agricultural film and sheeting, vinyl flooring and protective coatings, are said to be completely compatible with vinyl chloride resins at concentrations as high as 70 parts of plasticizer/100 parts of resin.

Half-Dollar Aerosols

Titan Chemical Industries (Denver, Colo.) will begin marketing 13 products in 3-oz. aerosol dispensers this week. It will offer four air freshener aromas, a hair spray, furniture polish, shave lather, sachet, shoe polish, plant shine, hair shampoo, hand lotion and baby lotion. They'll all be priced below 50¢, will be marketed initially in tin cans, later in aluminum dispensers. First marketing of the product will be through brokers. Addition of the small units will bring to around 100 the number of items being marketed by the 2½-year-old company.

Paint Primer

To keep the building industry abreast of changes in paints and coatings, the Building Research Institute (part of the Division of Engineering and Industrial Research of the National Academy of Science) has published a book outlining top developments of the last 10 years.

Methods of application, causes of deterioration and techniques of maintenance are covered, and special attention is given to paints for industrial use. A section is also devoted to the future of paints and coatings. The 150-page book, "Field Applied Paints and Coatings," is available ($5/copy) from the Building Research Institute (2101 Constitution Ave., Washington 25, D.C.).

PRODUCTS

One-Shot Brightener: Isobrite 623, an additive for copper-plating solutions, has just been introduced by Allied Research Products, Inc. (4004 East Monument St., Baltimore, Md.). Allied says its new plating agent is a one-shot brightener, operates either as a semi- or a full-bright additive. About ½% by volume Isobrite is added to the plating solution.

•

Multi-Killer: Otis Clapp and Son, Inc. (Boston) is out with Obtundia

First Aid Aerosol Spray. Obtundia is a combination antiseptic, germicide, surface anesthetic, surgical dressing and fungicide. A 3½-oz. bottle retails for $3.

•

Tanner's Expose: Bikini French Formula Suntan Cream is Helena Rubinstein's latest product addition. A 3¾-oz. tube sells for $2.

•

Spots-Out: A new tarnish- and corrosion-inhibitor for copper and brass is being offered by Enthone, Inc., subsidiary of American Smelting and Refining Co. (New Haven, Conn.). The new product, called Entek CU-55, is said to react with copper and copper alloys to form a coating that prevents staining, "green salt" formation, finger marking, pit corrosion and spotting-out under high humidity.

•

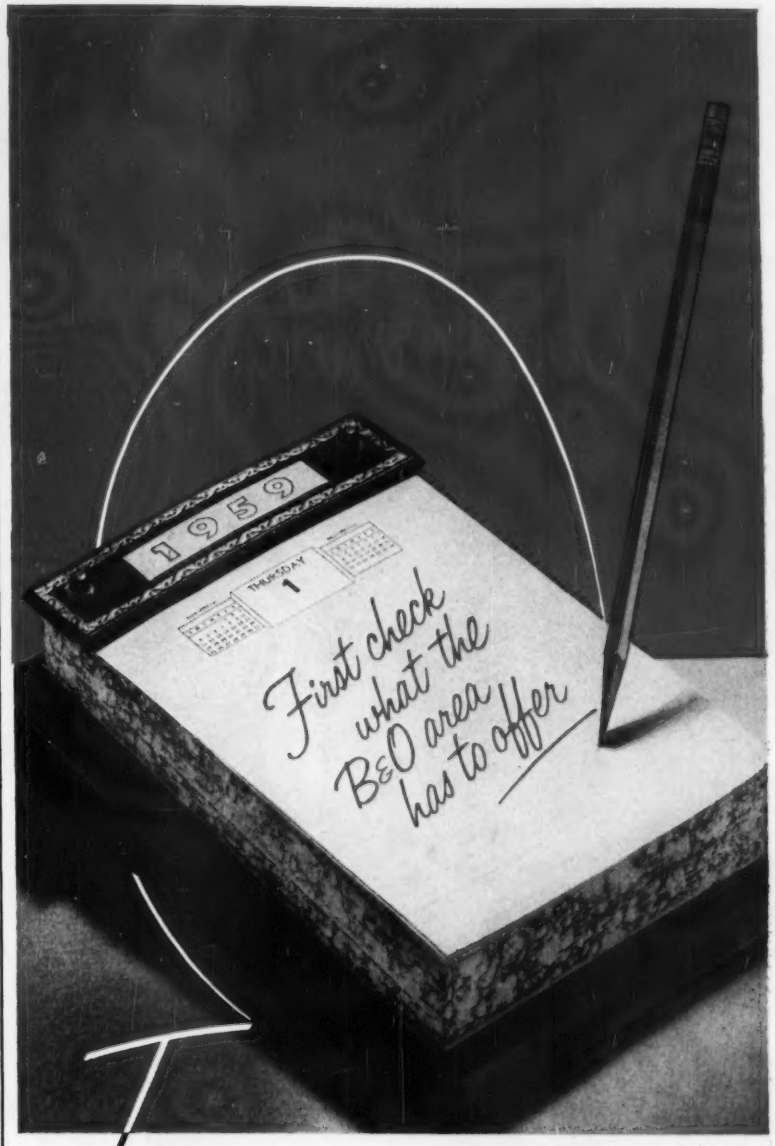
Corrosion Inhibitor: Commercial availability of petroleum fuel corrosion inhibitor Nasul LP has been established by R. T. Vanderbilt (New York). The product, a non viscous liquid with a pour-point of —30 F and a viscosity at 210 F of 45 seconds, has been used by the military in jet engine fuels and aviation and automotive gasolines. Vanderbilt suggests it for civilian fuels, as well as for use as a pipeline protectant.

•

Chicken Feeder: American Cyanamid is making an equipment premium offer to help push sales of its Aureomycin Soluble Powder. The premium is a device that automatically puts the antibiotic into the lines of automatic poultry water systems. The device is called the Auto-Matic, is said to be worth about $50, is provided with each four-drum order.

•

Cooking with Freon: A cooking aid that uses a Freon fluorocarbon product to cut meat roasting time in half has been developed by Thermo Pin Corp. (Box 406, Mineola, N. Y.). The device consists of a hollow stainless steel probe in which the Freon is sealed. Inserted in the meat with the finned tips exposed, the unit conducts heat to non-exposed meat areas quickly, with the Freon acting as main transfer agent. Thermo Pin is said to cut thawing time for frozen meat as well. Retail price: $14.95 for a set of two pins.



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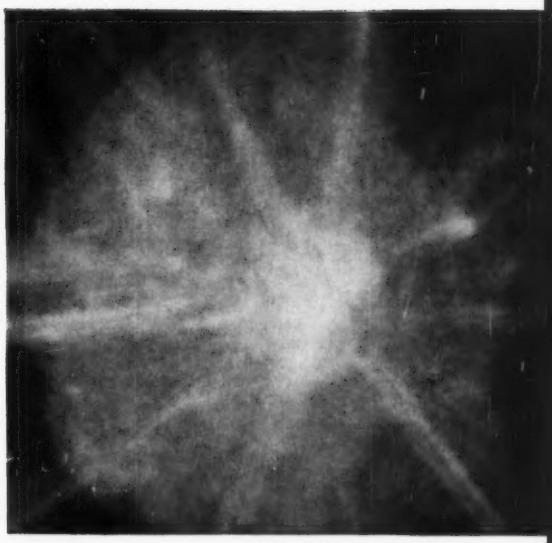


PICTURES COURTESY ALLIED CHEMICAL

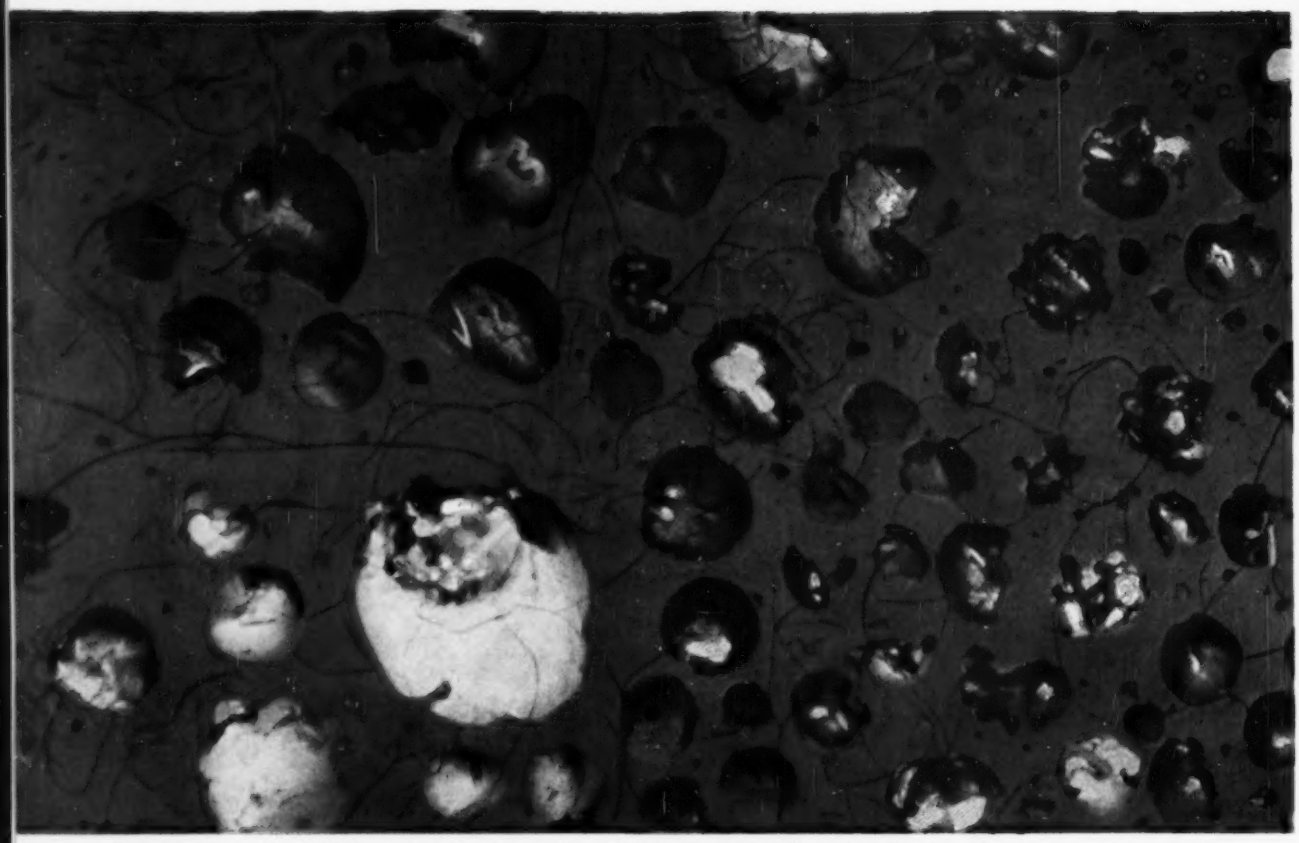
The CPI is finding a spate of uses for color photographs taken in research laboratories. Typical: microphotographs showing chemical reactions (left, di-isocyanate reacting with water and an alkyd; above, formation of a polyester). The pictures are finding uses in analytical and comparison studies, management reports, advertising.

Color Captures Research Realism

Technological improvements are currently turning color photography into a full-fledged research laboratory tool. Photographically faster films, with truer colors, now do a host of important lab jobs—they're used as analytical and comparison tools, for management reports, research records, for advertising, publishing and presentation of technical papers.

For example, James Howard, head photographer at Interchemical Corp.'s laboratory (New York), points out how color shots help researchers in dyestuff evaluation. He takes 4 x 5-in. color transparencies that show color penetration of inks in paper and dyes in textiles. He adds that "for research, transparencies are better for color rendition than color prints." (There's always a problem of educating viewers of the color prints to the fact that, while such pictures are good tools for color differentiation, they are not necessarily good ones for color reproduction.)

But there is some disagreement on this point. Eastman Kodak reports that Lever Brothers (New York) research laboratories are making Ektacolor negatives of Lifebuoy soap bars, to check both deformities in molding and color. When a bar of soap is measured for hue, under a Gardner color difference meter, and a "Type C" print made from the negative is tested the same way, the results are very close. Lever, however, is mum on its color program. A spokesman



Microphotograph of lab rocket fuel reaction. High-speed movies of rocket exhausts are also made.

there noted that "some color work was being done in the labs"—but not yet enough that is considered by the company to be of outstanding value.

Other chemical process companies that use color pictures for research analyses and records include:

General Petroleum (Los Angeles), which uses "Type C" prints to record tests in developing gasoline additives, lubricating oils. Color prints clearly illustrate minute carbon deposits or corrosion on engine parts.

Thiokol Chemical (Trenton, N.J.), which, at its Reaction Motors Division, uses color motion pictures to analyze exhaust fumes of rocket engines being run on new fuels. The firm notes, "This is the only way to record results of the test—we can't get closer than 750 ft. to the engine for safety reasons. It also affords a permanent record for future comparisons, permits the running of the test without having to bring in some very high-priced personnel from great distances" (the films are flown to them later for evaluation).

Time and Money: Aircraft companies, too, have gone in for color photography in a big way. North American Aviation Inc. (Los Angeles) tells *CW* that in its six divisions it takes "over 4,000 color still pictures weekly, makes extensive use of 16-mm. color motion picture film. There's no particular saving of time or money—but it is an excellent research tool."

One of the places where color pictures are taken is the wind tunnel, where pictures can be used to analyze air flow and heat. Also, NAA uses the photos for analyses of rocket exhaust fumes.

Convair (San Diego) has employed large quantities of color film to help analyze heat distribution in metals, color changes in corrosion tests, paint and plastics applications. It uses black-light photography of fluorescent dyes to detect surface and subsurface flaws in manufactured parts. A spokesman there said: "Color photography has proved itself to be an extremely valuable tool, capable of recording fleeting effects, that are either too small or too fast for the eye to observe or analyze. It saves us both time and money."

Management Aide: U.S. Steel is one of several firms that take extensive color photos in the lab, primarily for management reports, or to illustrate technical talks. J. L. Marks, assistant to the administrative vice-president for research and technology, says, "Although cost figures are unavailable, we do have a staff of 11 full-time photographers at the research center. We do 95% of the processing ourselves. Typical uses: coal studies, petrographic studies of slags and refractories, process studies, chemical and metallurgical identification."

Esso Research & Engineering (Linden, N.J.) is also extensively using color photography as a management tool. It claims such photography is

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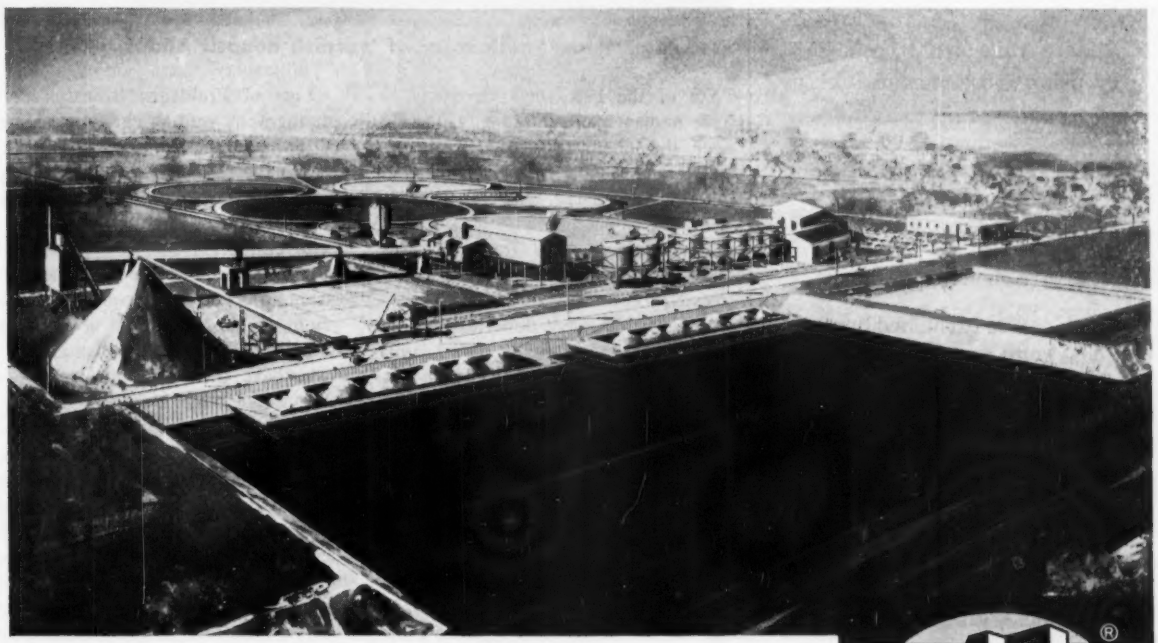

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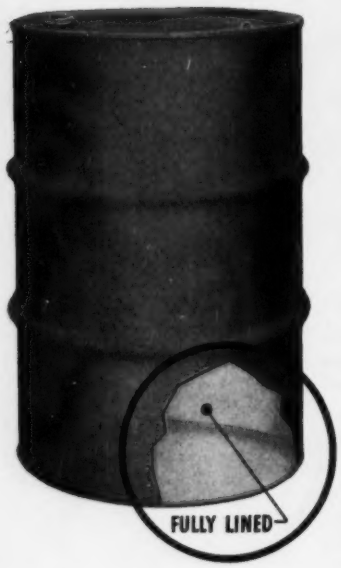

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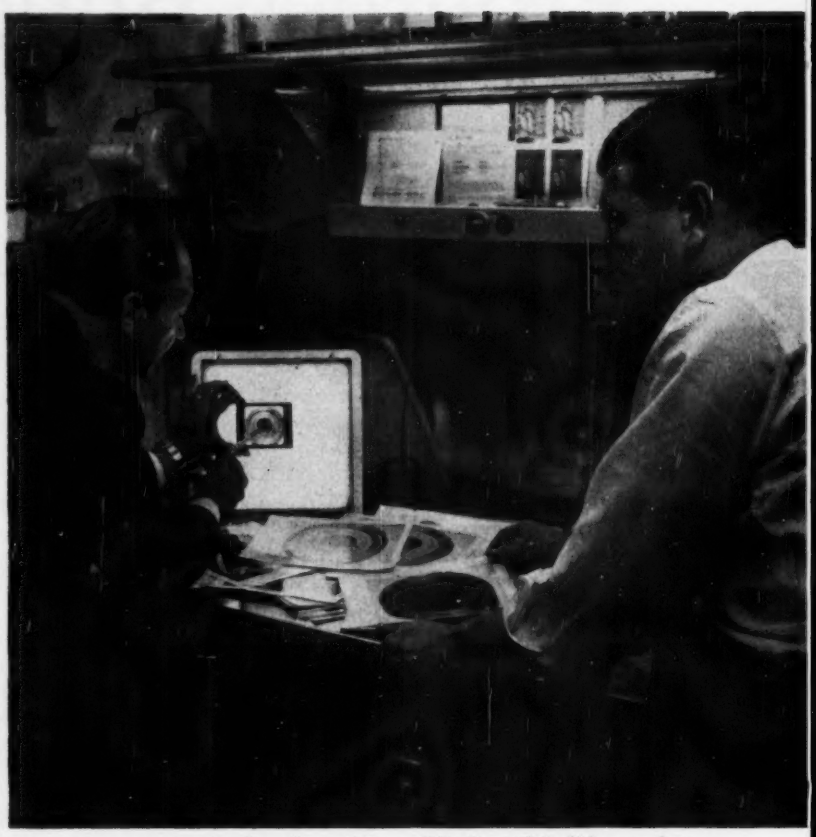


Esso cameramen check color of 'varnish deposit' slides, prints.

"one of the best ways we know to have management continually peering over the chemist's shoulder"—especially when experiments are carried out at distant places. One case in point is the development of a plant disease inhibitor for banana trees. Pictures taken in South America of diseased trees and also those treated with new-type herbicides were flown to Linden, and Esso's seven-man photo unit turned out 160 sets of prints in two days for use at a management meeting.

Other Uses: Allied Chemical Co. has found color photography most useful in advertising, has used the pictures appearing with this article as marketing tools. Dow Chemical Co. (Midland, Mich.) echoes Allied, but notes that use in advertising, promotion is secondary to research recording, use in management reports. Ciba Pharmaceutical Co. (Summit, N.J.) does most of its color photography to produce visual aides for technical talks, also makes 16-mm. motion pictures of certain experiments for showing to people in the medical field.

Lots of Problems: Research color photography isn't as cheap or as easy as it was in the "you press the button we do the rest" days. Cost of equipment runs high (especially when special work such as photomicrography is involved), often can be justified only by a large volume of work. The same goes for even higher-priced skilled photographers. Solution: it may pay to bring in a man for one job at a time, have the processing done outside.

Quality can be a problem too. Most firms demanding critical color accuracy do their own processing. Socony Mobil Oil Co.'s photographer, Albert Lake, ran into a manufacturing problem—found that Kodak puts a protective spray on its Kodacolor prints that darkens the colors, making them useless for many color comparison tests. He had to change films. He adds that "color doesn't give the sharp detail available from black and white pictures, but does give a better overall rendition for management reports."

Time Lag: Time lag between taking

of pictures and analyses can be several days if outside processing is used, may void the value of an experiment. Some firms overcome this by on-the-spot processing. Polaroid's Land Camera picture-in-a-minute process (black and white) has been adopted to lab use (e.g., photomicrography), may solve part of the time lag problem when its color film becomes available (*see CW, April 19, '58, p. 63*).

Most firms told *CW* they plan to increase color photo facilities, find the cost is justified by enabling accomplishment of work that would otherwise be impossible or more difficult to do. And it is a sure bet that film and photo equipment manufacturers will be pressed to upgrade their products as new lab uses are found for color photography.

New Chemical Armor

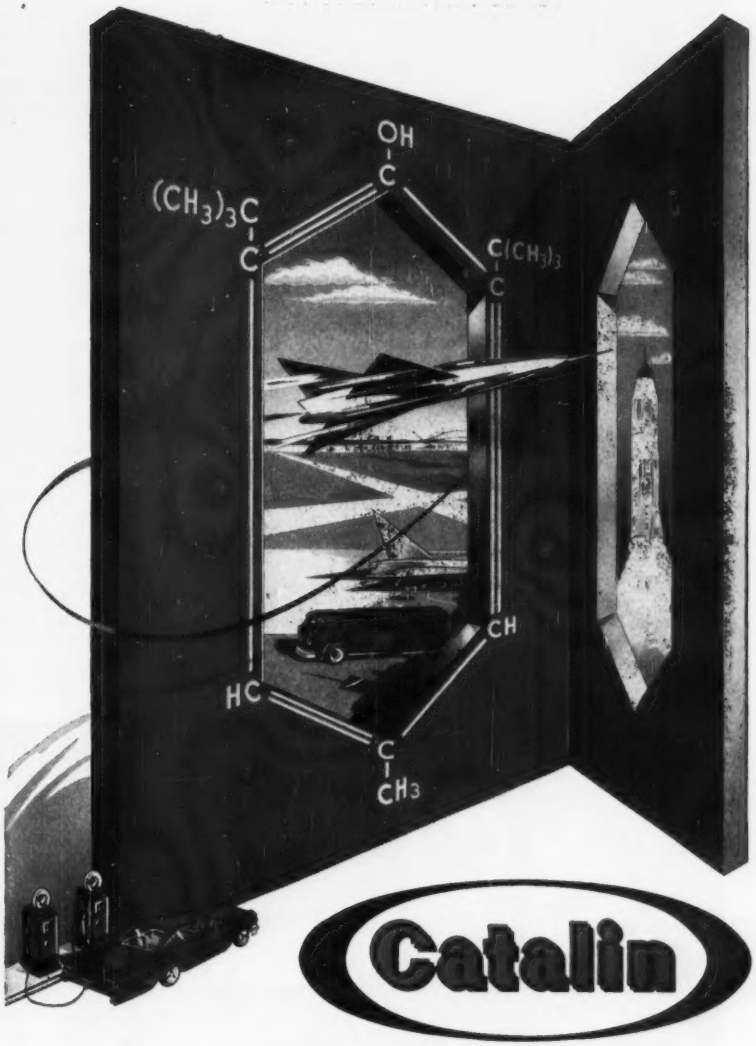
The Army's chemical warfare chief warned last week that the "deep interest" of the Soviet Union in chemical and biological weapons "can only mean that they will take the initiative in waging such warfare if they deem it to their military advantage."

Maj. Gen. Marshall Stubbs told the Midwest chapter of the Armed Forces Chemical Assn. in Chicago that Russia is devoting "considerable effort" to research in military poisons, with special emphasis on the psychic poisons that simulate mental disease.

He warned that Soviet chemical weapons are modern and effective, probably include all types known to the West and perhaps a few others. He declined, however, to give any comparison of U.S. vs. Soviet capabilities.

General Stubbs reported two new developments by the Army aimed at protecting soldiers and civilians against chemical biological attack. One is a new canisterless mask, which has been fully tested and is ready for production. It utilizes a molded piece inside the face mask, with new chemical components, which is more effective and less cumbersome than old gas masks. The Army is also developing ways of impregnating clothing so that the presence of chemicals is indicated by a change of color. The fabric also resists penetration, but is not heavy and oily as are GI protective garb now used.

Much of the Soviet hardware is



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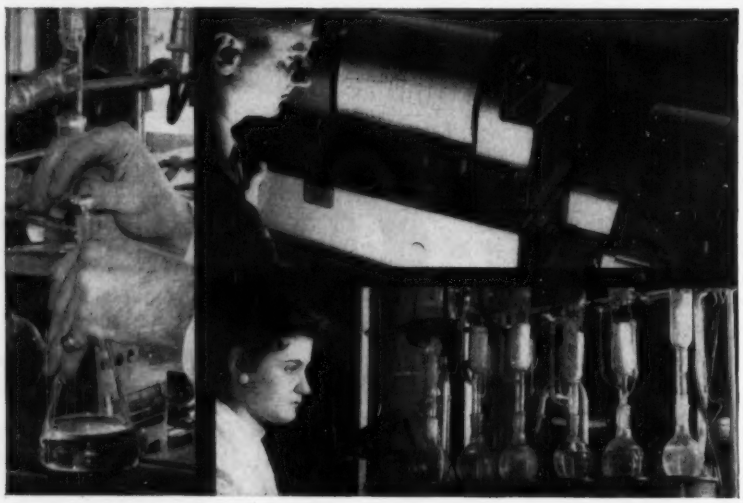

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RESEARCH

multipurpose. Conventional artillery shells, said Stubbs, incendiary bombs and rotational scattering aircraft bombs can be readily converted to chemical warfare. Biochemical attacks could be launched against our coastlines with missiles launched from submarines, he reports. Defensive studies using a harmless tracer have shown that an area of several thousand square miles could be contaminated without the population even knowing an attack had occurred.

The best line of defense? The ability to retaliate, he indicates.

The Chemical Corps' budget, as part of the over-all defense budget, is currently under Congressional review.

EXPANSION

• General Electric Co. will carry out research and development of silicon semiconductor rectifier equipment in its newly established direct-current advanced engineering center in Philadelphia. The center's laboratories contain chemical, metallurgical, measurements and crystallographic facilities.

• Schwarz, Speel and Associates is a new textile and chemical consultant firm with offices at 101 West 31st St., New York 1.

• University of Pennsylvania is building a $1.5-million chemistry wing, to house laboratory facilities. One-third of the funds are being sought in the CPI; the rest: an anonymous grant.

• Owens-Corning Fiberglas Corp. plans to relocate its basic and applied research and product testing laboratories now adjoining the Newark, O., plant, to a 150-acre site near Granville, O., where its pioneering laboratory is now established.

• Dedication of Atlantic Research Corp.'s (Alexandria, Va.) new $1-million headquarters is scheduled for early June.

• A jointly owned company has been formed by Electric Storage Battery Co. (Philadelphia) and Reeves Bros., Inc. (New York), to develop and ultimately to manufacture "microporous plastic materials." The firm, called ESB-Reeves Corp., will seek uses for the materials in rainwear, other apparel, etc.

• Stanford Research Institute has set up a new propulsion group within the institute's Poulter Laboratories to handle basic research on improved

rocket fuels in connection with contract research on propellents for United Research Corp.

• A new building now under construction at the Sterling-Winthrop Research Institute (Rensselaer, N.Y.) will double existing facilities for research in the biological sciences.

PRODUCTS

Acid Entry: Kainic acid (2-carboxy-3-carboxymethyl-4-isopropenyl pyrrolidine) is now available from Fallek Products Co., Inc. (165 Broadway, New York). A vermifuge, the acid is offered for investigational or manufacturing use.

•

Urethane Flame Retardant: Vircol-82 is Virginia-Carolina Chemical Corp.'s new phosphorus-containing polyol (*CW Technology Newsletter, May 2*) for use as a chemically bound coreactant in making flame-retarding urethane foam. The compound is offered at a developmental price of $1.10/lb. in drum lots, f.o.b. Charleston, S.C. Anticipated commercial price range is 35-50¢/lb. The compound may be used in both polyester- and flexible polyether-based foams, is said to yield foams at a cost comparable to that of conventional foams.

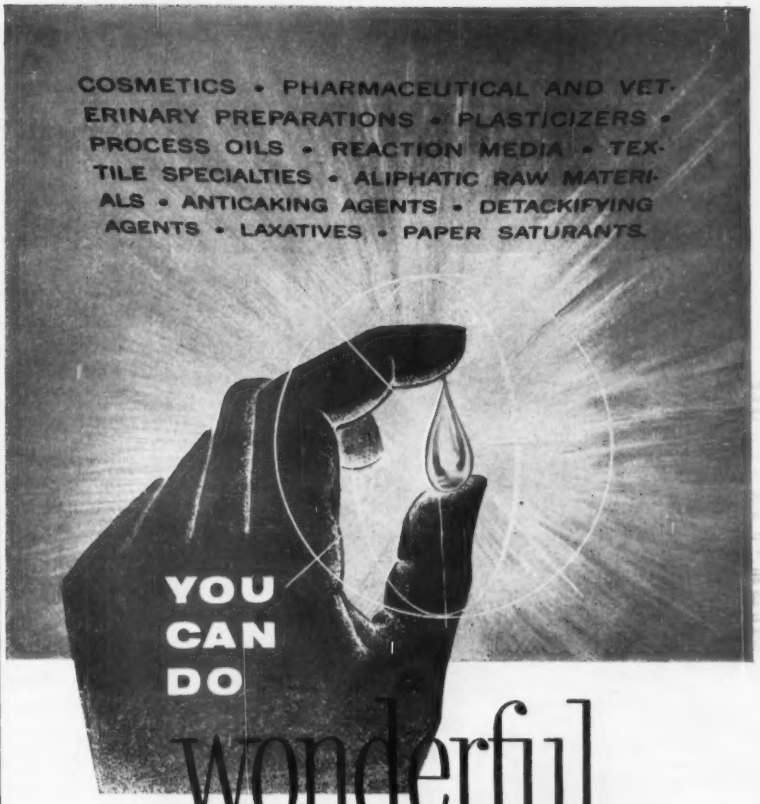
LITERATURE

• The monthly Russian "Journal of Inorganic Chemistry" is being translated in its entirety by The Chemical Society (Burlington House, London W 1, England). Subscription rates: $90/year (universities and colleges get a 25% discount). Single issues: $12. Plans for the future include cover-to-cover translations of the Russian "Journal of Physical Chemistry" and "Progress in Chemistry."

• A four-page brochure on scintillation-grade fluorescent chemicals and plastic scintillators (Bulletin 591) is available from Pilot Chemicals Inc. (Watertown, Mass.).

• A technical bulletin on Vinylon, a synthetic polyvinyl alcohol fiber is available from Air Reduction Co. (150 East 42nd St., New York).

• Testing of glass volumetric apparatus is the subject of the National Bureau of Standards Circular 602. It's available for 20¢ from NBS (Washington 25, D.C.).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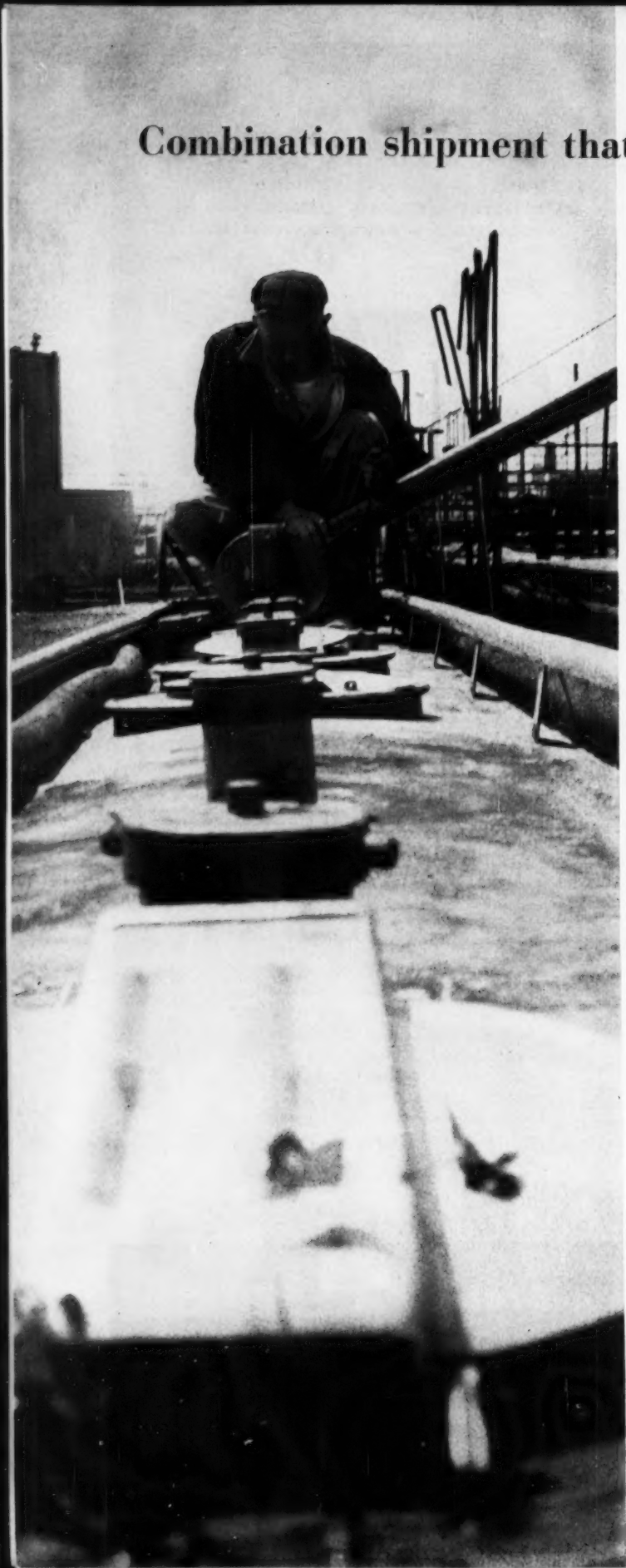

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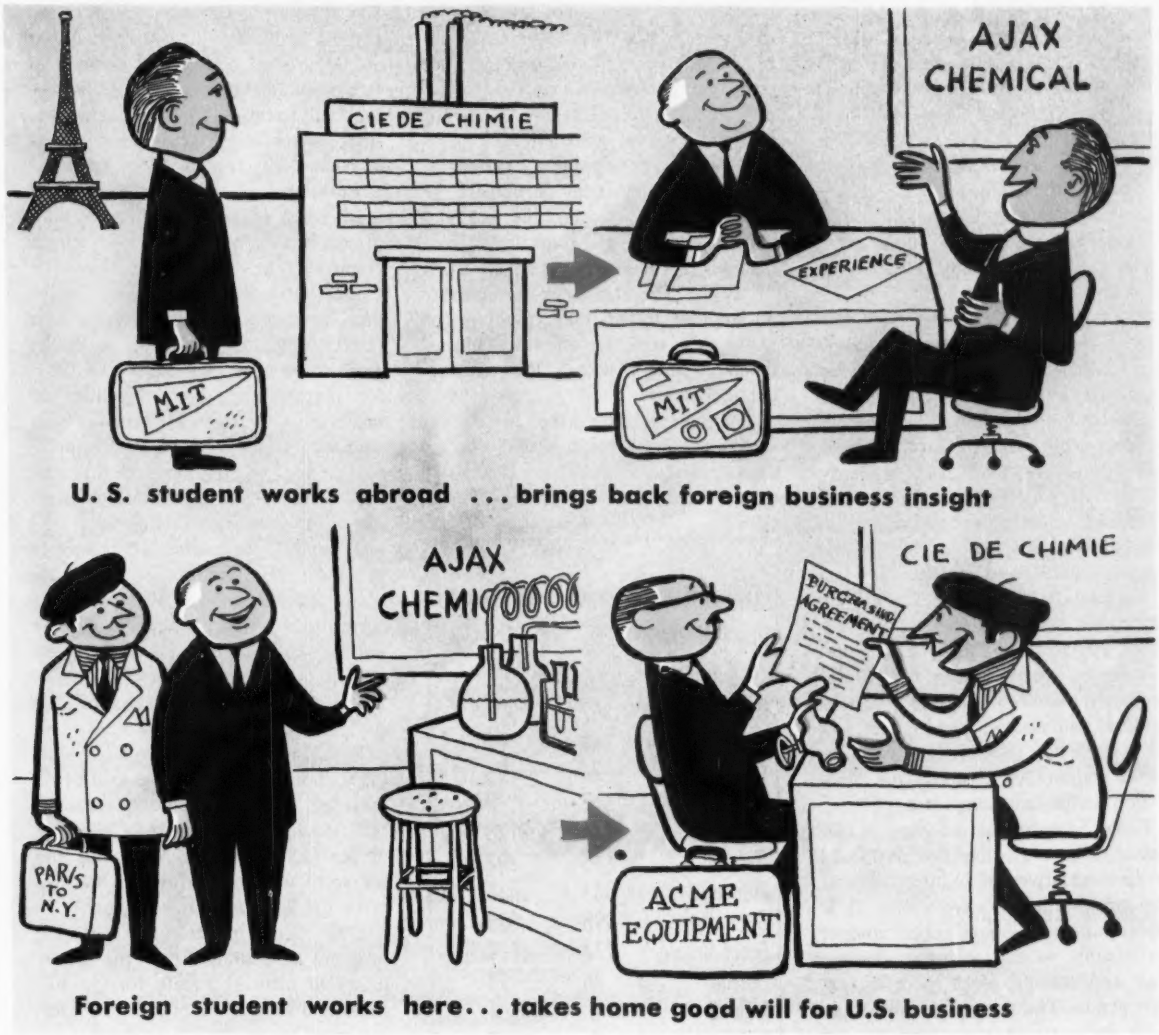
Student exchange yields dual benefits for U.S. business



Foreign Flavor for Future Management

Next month, 95 U.S. technical students—including 24 future chemists and chemical engineers—will head for plants in 15 foreign countries for a summer of on-the-job training. Their experiences will set in motion a new cycle of a student exchange program destined to provide dual benefits for U.S. industry (see above)—and, perhaps, some of its future employees.

The students, and a like number of their foreign counterparts who will be coming to the U.S. for similar training, will be participating in the program of the International Assn. for the Exchange of Students for Technical Experience (IAESTE). By summer's end, the U.S. students will have gained insight into foreign business methods and industrial techniques, and the foreign students—some of whom will train in 12 chemical process firms—will have formed friendships within U.S. companies that will serve as a foundation for international understanding and goodwill—and help them to better understand U.S. business.

IAESTE is a private, nonprofit organization, sponsored in this country by the Engineers Joint Council. The 11-year-old association is composed of 26 member countries, which have exchanged a total of 39,996 students among some 2,777 participating companies. The U.S., a member since '55, last year sent 82 students abroad, received 52 for training in 35 companies—including seven CPI firms, one college and one state agency. In '57, the U.S. sent 82 students under the program, received 86 students.

This country's participation has

been poor in comparison with that of Germany, which last year sent 998 students abroad, received 1,023; Great Britain, which sent 774, received 829; the Netherlands, which sent 446, received 370; and Yugoslavia, which sent 220, received 116 students.

Of the 5,394 students participating in the program last year, 410 were chemical engineers, 394 chemists. The Netherlands sent the largest number of chemical engineers, 61; Great Britain, 45; the U.S., 13. Great Britain sent the greatest number of chemists, 114; Germany sent 80; the U.S., five.

A total of 289 students were employed last summer by chemical engineering firms, 439 by chemical firms. Chemical engineering firms in the Netherlands took in 58 students, Swedish firms took 48. German chemical companies took 107 students, similar British firms employed 87. Chemical engineering and chemical firms in the U.S. employed two and seven students, respectively.

Association Machinery: There is no permanent secretary for the international association. The general secretaryship is rotated among the permanent secretaries of the various national committees. The general secretary and two men elected from national committees compose the association's advisory committee.

Each participating country is required to have a committee composed of representatives of industry, education and students' associations. It is the committee's job to solicit student participants in the program, process their applications, place them in foreign plants. The committee also must enlist industry support, line up job opportunities in this country for foreign students.

Given information on the number of U.S. jobs available and the number of U.S. students desiring to go abroad, American representatives each January attend the association's annual meeting, where the actual exchanges are made under the barter system. The U.S., for example, will say to Germany, "We can take five of your chemistry students. Can you take five of ours?" And so on it goes, until this country has placed its students, agreed to take a like number. Ideally, a country is permitted to send only as many students as it's willing to take, but because of the low number of job offers the U.S. has been able to make, it has in the past been allowed to place a larger number than it takes.

Dues for member countries are based on the number of students exchanged. The U.S. last year paid only $67, which went toward administrative costs incurred by the general secretary in the performance of duties for the international association.

Industry Participation: Companies in this country can participate in IAESTE by contacting the national committee at the Engineers Joint Council (29 West 39th St., New York 18, N.Y.). The firm states the number of students it can take, the type of work and training offered, requirements, and, if it wishes, the nationalities desired.

The firm is later asked to review applications of foreign students fitting its specifications. For each student it accepts, the firm is required to pay the national committee $100 to cover administrative costs. The company also is expected to pay the student's salary, provide industrial experience and training, assist the student in becoming socially adjusted. In the last area, the firm can expect some help from national student associations, although, according to the committee, such groups in this country are not as active as their foreign counterparts.

Problem Areas: Biggest problem is the need to expand participation, both of countries and companies within countries. In this connection, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has reserved a travel grant to be used this year by IAESTE for investigating the possibilities of increasing student exchanges with countries in southern Asia and northern Africa. In addition, the association is considering admitting interested Latin-American countries.

The U.S. committee has similar problems. The committee, only recently taken under EJC's wing, is currently working on plans to expand industry participation. According to Committee Secretary Josef Wischeidt, Jr., this country must exchange 200 students yearly to break even on expenses. To send that many, of course, U. S. industry would have to provide jobs for a like number. At present, EJC is underwriting part of the cost of the U.S. operation, Wischeidt and his secretary are performing various tasks for EJC as part repayment.

U.S. firms participating in the program have praised both the opportunity to meet and train foreign students and the caliber of students coming over. And, foreign students have indicated that they gained a great deal from their experiences in this country. Thus, U.S. industry is already setting the stage to reap one of the benefits from the exchange program—the friendship and understanding of the future leaders of foreign industry. (There is no limitation on U.S. firms' hiring of the exchange students, if they so desire.)

The other benefit—the value of having on the payroll a young engineer or scientist who has observed, firsthand, foreign business methods and industrial techniques—will come a bit later as U.S. students with that experience leave the college ranks, seek employment in U.S. industry.

International Student Exchange in '58

	Sent	*Received*
Austria	562	308
Belgium	69	69
Canada	24	95
Ceylon	2	0
Denmark	144	120
Finland	175	202
France	343	416
Germany	998	1,023
Great Britain	774	829
Greece	86	73
Iceland	0	1
India	0	3
Israel	97	60
Italy	177	153
Netherlands	446	370
Norway	149	152
Portugal	55	31
Spain	244	207
Sweden	359	736
Switzerland	151	202
Turkey	232	166
Union of So. Africa	5	10
U.S.	82	52
Yugoslavia	220	116
Totals	5,394	5,394

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3-60	23-28	2-4	99-97.9
20-60	21-25	19.5-24	89-86
1-30	4-6	0-3	100-98.5
20-30	4-6	19.5-21.5	89-87.7
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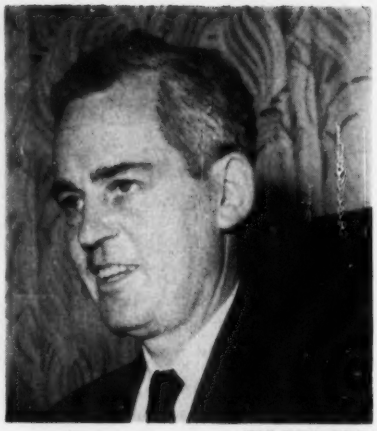

WIDE WORLD PHOTOS

GE's McCune: National viewpoints for a strong state program.

Fostering State Atomics

Appointment last week of the first chairman of New York state's new General Advisory Committee on Atomic Energy marks the first action of the state's powerful Office of Atomic Development. The appointment is consistent with the character of one of the strongest state atomic laws yet passed.

New chairman is Francis McCune, president of Atomic Industrial Forum and vice-president in charge of atomic business development for General Electric. His committee will advise the Office of Atomic Development, headed by Oliver Townsend, another AIF-schooled executive, who, on April 3, took over the job created by the new law signed recently by Governor Rockefeller.

Observers of state atomic development activities are interested in New York's law because, contrary to actions in other states, it puts guidance of atomic development efforts at an extremely high level in government. Whereas Ohio, Tennessee and Florida have just recently placed their programs under the wing of existing economic development or commerce agencies, New York's office reports directly to the governor. Moreover, McCune's connections and experience have been on a national rather than state level; and the organization follows lines of recommendations by the Council of State Governments.

New York's program starts out running, as far as finances are concerned. Initial authorization for the year (until April '60) is a whopping $100,000; a separate appropriation enables the state to put up $1 million in funds to match those of the University of Buffalo for erecting a nuclear research center.

Townsend's office will include a deputy and counsel. There's a possibility that still another staff member may be named later.

Townsend outlines two prime goals for the new office, once he has obtained a staff and an advisory committee. His first efforts will be to help clarify the hazy area caused by overlapping between federal and state laws and prerogatives; next will be design of an over-all atomic development plan for New York state.

Townsend follows what he calls a "normalization" approach. That is, he expects that his office will, in time, become a home for nuclear objectives not at home in other agencies.

Already, for example, much of the responsibility for health and safety aspects of radioaction technology is divided between New York state's Labor Dept. and Health Dept. The state atomic office will make no effort to administer these.

Observers expect the New York development scheme, with powers being held at such a high level and with powerful backing from government, to provide a good proving ground for other states that may be thinking about such programs.

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ADMINISTRATION

LEGAL

Upjohn 'Fair Trade' Move: In the latest move by a major pharmaceutical firm to block less-than-list-price sales of its products, Upjohn Co. has obtained a preliminary injunction against Chestnut Street Wholesale Sundries, Inc. (Philadelphia). The court order prohibits the store from selling or advertising Upjohn products at less than the company's minimum prices.

In a spirited two-day hearing in Philadelphia's common pleas court, Upjohn said it felt that price maintenance laws were reasonable in that they enable the small retailer to compete fairly. The laws help maintain wide distribution of drug products in pharmacies in all neighborhoods so that they may be readily available when needed, the firm added. In recent months, the company has obtained injunctions against nine retail outlets in the Philadelphia area.

•

Lever Trademark Suit: A consent decree has been signed in federal district court in Cleveland enjoining several Cleveland firms from infringing on the Lever Bros. Co. trademark "all." The decree enjoins Merle Moritz, trading as William Roberts Oil Products Co. and William Roberts Oil Products, Inc., and William Magid, agent.

Lever's suit *(CW, April 11, p. 36)* charged the defendants with manufacturing and selling a detergent called "All." Defendants were ordered by the court to deliver all labels and other identification of the trademark to Lever Bros. for destruction. There has been no action on Lever's plea for an accounting of profits and treble damages.

LABOR

Nuclear Vote: Employees of the Western Nuclear Uranium Mill at Jeffrey City, Wyo., have voted to have the United Mine Workers of America represent them.

In a plantwide election, UMW received 39 votes; 27 employees voted for no union. Nine workers voted for Oil, Chemical & Atomic Workers Union or a combination of the Electricians, Operating Engineers and Teamsters unions. Last year, Western Nuclear employees voted against having a union affiliation.

Potash Agreement: American Potash & Chemical Corp. (Henderson, Nev.) and International Chemical Workers Union have settled terms of an agreement on a new work contract. The company made the same wage increase offer to the machinists, pipefitters, electricians and operating engineers unions, but it was rejected. Terms of the ICWU settlement have not been revealed, pending ratification by the union membership.

•

No Decision: In another nuclear materials plant, a bargaining election resulted in no decision. Oil, Chemical & Atomic Workers Union says a National Labor Relations Board election at Kermac Nuclear Fuels Corp. (Grants, N.M.) failed to produce sufficient majority and a runoff election will be necessary.

OCAW says that District 50, United Mine Workers, received 130 votes; OCAW, 123; United Steel Workers, 35; Stone and Allied Products Workers, 2; Hod Carriers, 1; and "no union," 35—out of 384 eligible. The runoff vote between UMW and OCAW, expected in 10 days or two weeks, is significant since six major uranium mills are being organized in the area.

•

Carbon Contract: Production and maintenance employees of Great Lakes Carbon Corp. have accepted a two-year contract calling for a 3% general wage increase. The employees are represented by Local 12896, District 50, United Mine Workers.

The increase is retroactive to April 6. The contract provides for a wage reopener March 31, '60, the right to accumulate an additional 40 hours' sick leave, fixing the maximum at 320 hours; and a 10¢/hour bonus for continuous shift operation on Sunday, increasing to 15¢/hour in the second year of the contract.

•

Merger Snag: Merger talks between the two big chemical unions have run into some snags. In preparation for the May 11 merger committee meeting in Chicago, the unions (Oil, Chemical & Atomic Workers and International Chemical Workers) had hoped to agree on a proposed constitution. Instead, the merger committee will be presented only with a set of general principles agreed on by officers

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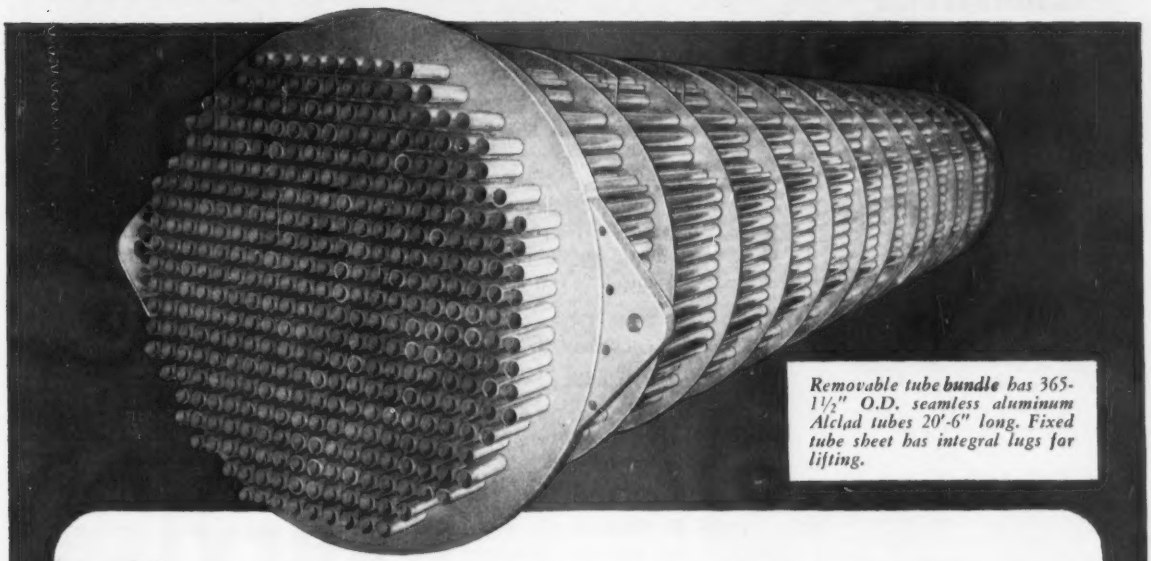

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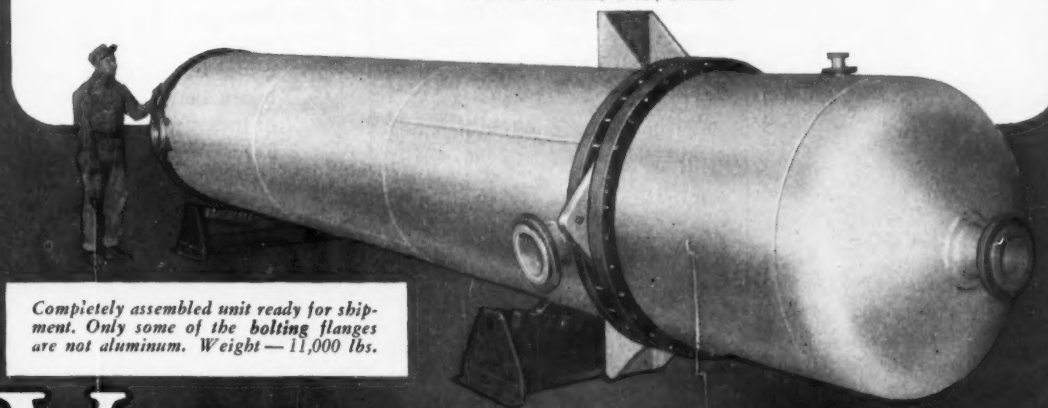

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ADMINISTRATION

of both unions, and will try to develop merger terms from them. A key point of disagreement between the unions: composition of the executive board. OCAW favors a rank-and-file board; ICWU wants the board made up of elected district directors. Locals of both unions are slated to vote on a detailed constitution this summer.

KEY CHANGES

William B. Murphy to director, Merck & Co. (Rahway, N.J.).

Jack D. Hayes to vice-president and director, **Alto J. Smith** to director, Ketona Chemical Corp. (Ketona, Ala.).

William Gage Brady, Jr., to president American Enka Corp. (Wilmington, Del.).

Herbert Hoover, Jr., to member of the finance committee, Monsanto Chemical Co. (St. Louis, Mo.).

Daniel R. Finn to vice-president, Baker Castor Oil Co., subsidiary of National Lead Co. (New York).

Ernest E. Swartswelter to director and vice-chairman, Blaw-Knox Co. (Pittsburgh).

Robert D. Bradford, Edward McL. Tittmann to executive vice-presidents; **Forrest G. Hamrick** to vice-president; **Charles F. Barber** to vice-president and director; American Smelting and Refining Co. (New York).

Wilbur H. Brumfield to executive vice-president, **Raymond Largent** to vice-president, Solvay Process Division, Allied Chemical Corp. (New York).

Kenyon D. Bowes to director, vice-president and treasurer; **John A. Purinton, Jr.,** to vice-president in charge of production; **Daniel C. Searle** to assistant to the president; G. D. Searle & Co. (Chicago).

B. J. Gray to vice-president in charge of biological and pharmaceutical production, Wyeth Laboratories (Philadelphia).

Alfred W. Knight to president, Western Precipitation Corp. (Los Angeles).

Herbert E. Hirschland to vice-president in charge of commercial development, Metal & Thermit Corp.

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Phillipsburg, New Jersey

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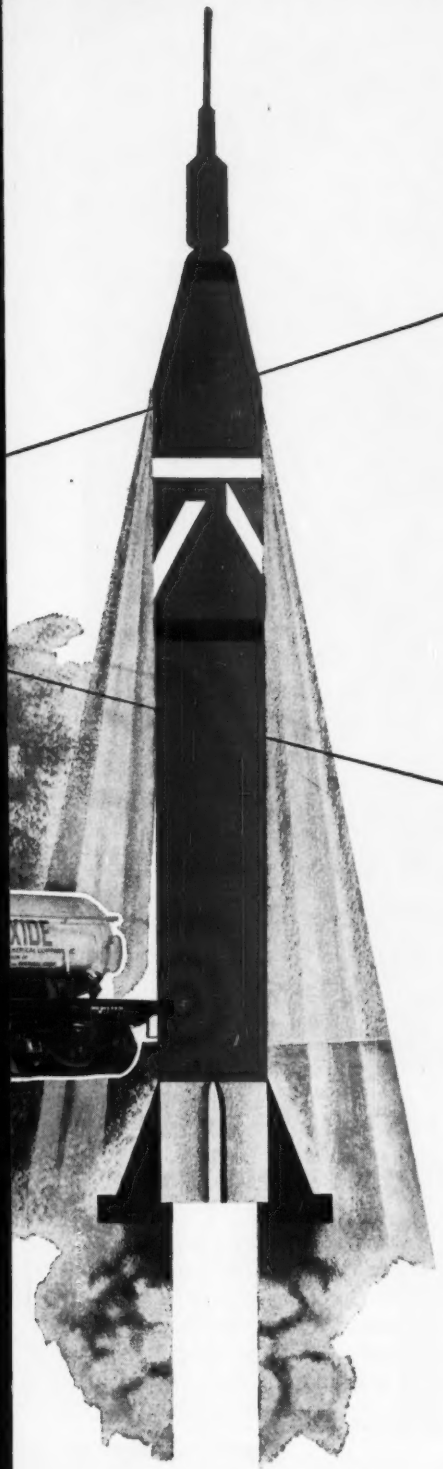
one of the guardians of this precious trademark



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Becco Chemical Division

STATION B BUFFALO 7, NEW YORK

February 27, 1959

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Phillipsburg
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General Sales Manager

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H. J. Newman, Jr.
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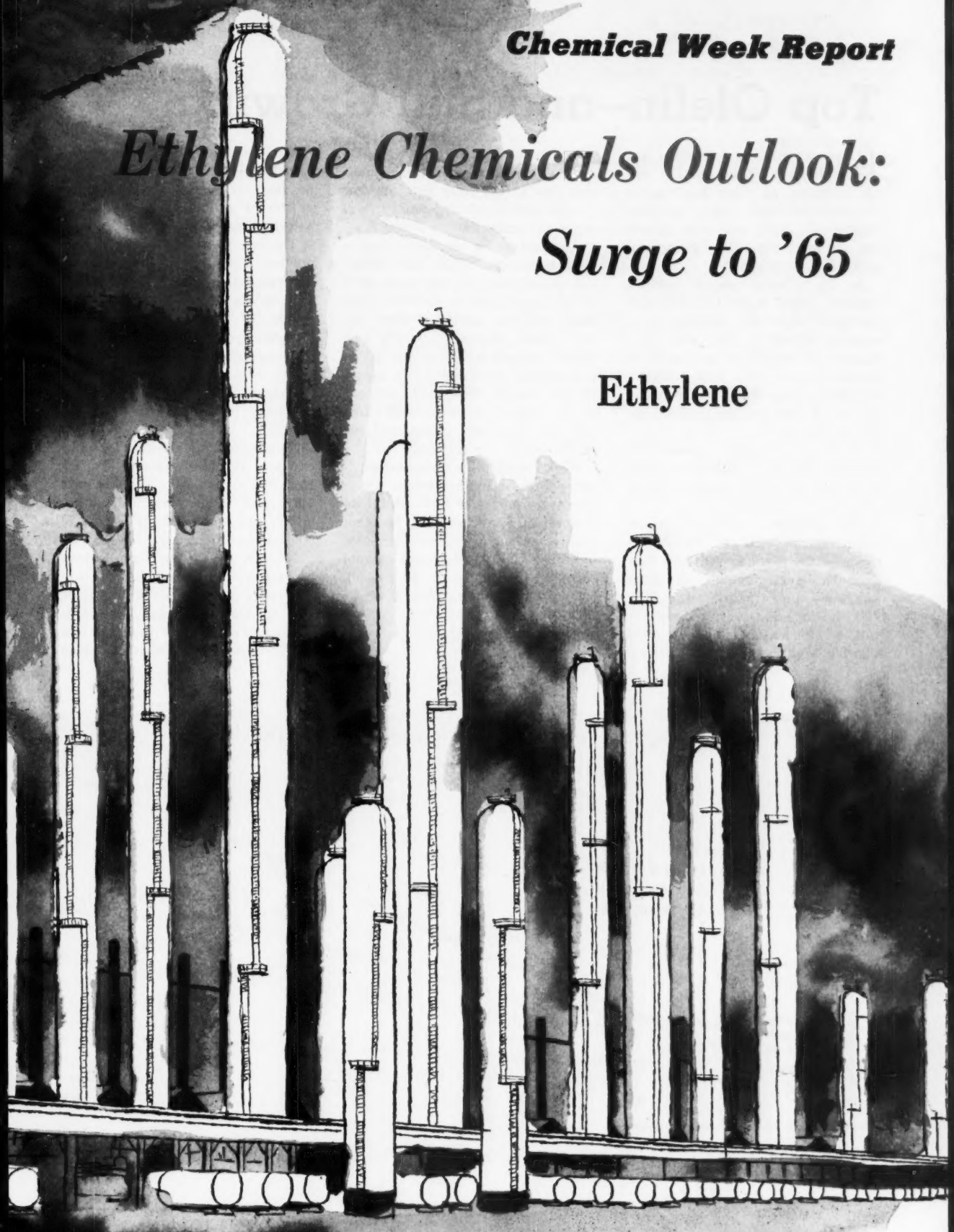
Chemical Week Report

Ethylene Chemicals Outlook: Surge to '65

Ethylene



"World's Largest"—Mobil's (Magnolia) proposed 380-million-lbs./year ethylene plant at Beaumont, Tex.; due early '61.

Top Olefin—and Still Growing

Ethylene, both in production and in diversity of commercial use, far surpasses all other hydrocarbon intermediates. And despite persistent competition from acetylene, propylene and other olefins, it will continue to hold the top spot.

In the 20-year period 1945-65, ethylene output in the U.S. will have multiplied eightfold, reaching a rewarding 6.5 billion lbs./year. As a measure of comparison, production of butylenes, propylene and acetylene will climb, respectively, to 3.6 billion lbs., 2.7 billion lbs. and 900 million lbs. by '65.

This year, ethylene consumption may well exceed 4.5 billion lbs., nearly 50% greater than chemical use in '55 *(see chart, p. 84)*.

But acetylene, among the major petrochemical building blocks, has moved forcefully into ethylene markets. This year, for instance, more acetylene—some 15-20% of a near-700 - million - lbs./year production—will go for manufacture of vinyl chloride. Well over half the vinyl capacity in the U.S. uses acetylene-hydrogen chloride as the starting material; just a few years ago, ethylene (via ethylene dichloride) was the preferred raw material.

Acrylonitrile is another once-important ethylene outlet now nearly lost to acetylene; approximately 83% of the acrylo made in the U.S. stems from acetylene, compared with only 17% from ethylene. (Sohio's new propylene-ammonia plant due in '60 will comprise 11% of the U.S. capacity that will by then have increased to 372 million lbs./year.) And ethylene has completely surrendered the acrylate market to acetylene.

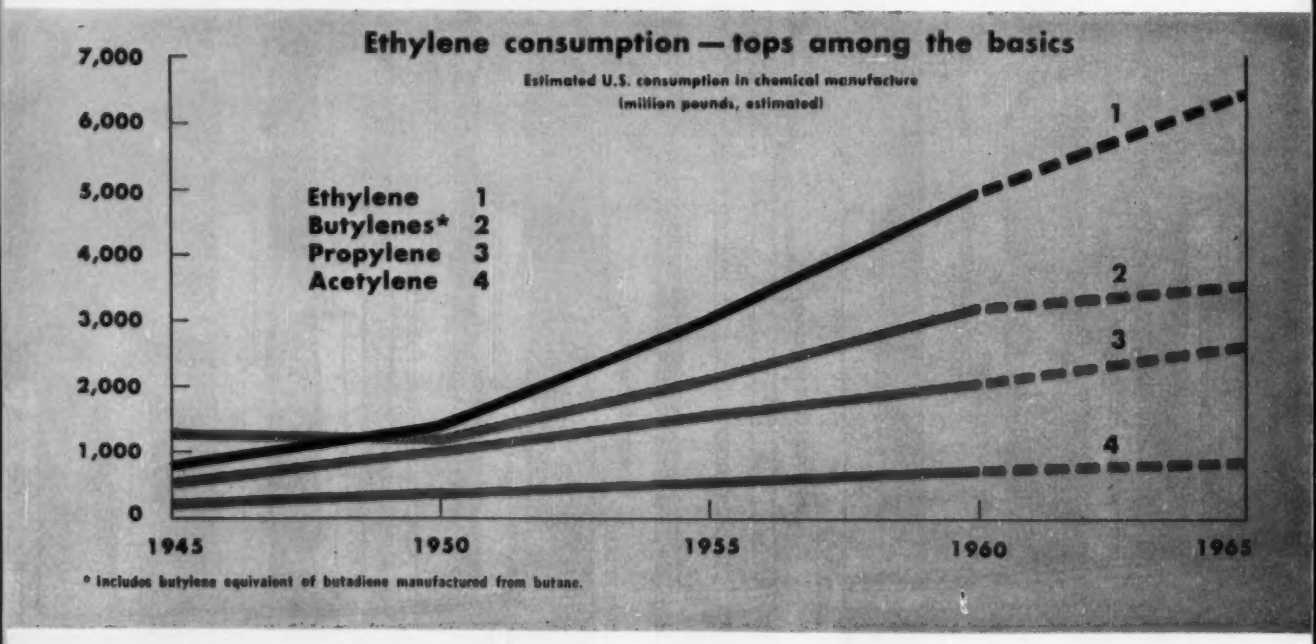
While competition between ethylene, propylene and butylene is not as direct, derivatives of these olefins do compete in many instances. Standout cases: ethylene oxide and glycol vs. propylene oxide and glycol; ethanol (ethylene), isopropanol (propylene), butanol (butylene). Significant, too, is the increasing rivalry likely among polypropylene, polyethylene and polystyrene.

Derivatives Climb: Behind the anticipated surge in ethylene output and use lies the generally uninterrupted growth of most ethylene derivatives, and the maturing of some new ones.

The increase in high-pressure polyethylene in the U.S. has, perhaps, been the most outstanding ethylene derivative development. And with the growth of the newer high-density (low-pressure) material, total polyethylene output is expected to increase from an estimated 860 million lbs. last year to almost 1.2 billion in '60 and 1.7 billion in '65 *(see table, p. 82)*.

Requirement of ethylene for polyethylene will nearly double by '65, from 900 million lbs. ('58) to almost 1.8 billion lbs. A note of contrast: in '55, only about 422 million lbs. of ethylene were needed *(see table, p. 83)*.

Nudged further by requirements for ethylene glycol antifreeze, surface-active agents, amines, diethylene and polyethylene glycols, the U.S. production of ethylene oxide will soar to 1.85 billion lbs. in '65, rising about



Major U. S. ethylene plants — today and by 1965

(million pounds, estimated)

	Plant location	'59 Capacity	Possible additions
Allied Chemical	Tonawanda, N. Y.	30	—
American Chemical	Watson, Calif.	—	80
Columbia Gas System	Siloam, Ky.	—	200
Dow Chemical	Plaquemine, La.	85	—
	Bay City, Mich.	35	35
	Freeport and Velasco, Tex.	530	—
	Midland, Mich.	120	—
Du Pont	Orange, Tex.	70	—
Gulf Oil	Port Arthur, Tex.	425	200
Humble Oil	Baytown, Tex.	80	100
Jefferson Chemical	Port Neches, Tex.	250*	—
Koppers	Kobuta, Pa.	25	—
Mobil Oil	Beaumont, Tex.	—	380
Monsanto	Texas City, Tex.	175	—
U.S. Industrial Chemicals	Tuscola, Ill.	330	—
Odessa Styrene	Odessa, Tex.	15	—
Olin Mathieson	Brandenburg, Ky.	90	—
Petroleum Chemicals	Lake Charles, La.	200	100
Phillips Chemical	Sweeny, Tex.	180	110
Shell Chemical	Houston, Tex.	150	—
	Torrance, Calif.	45	—
Standard of N. J. (Esso)	Bayway, N. J.	150	30
	Baton Rouge, La.	500	200
Texas Eastman	Longview, Tex.	175	50
Union Carbide**	Institute, W. Va.	310	—
	Putnam Co., W. Va.	—	150
	Seadrift, Tex.	330	—
	South Charleston, W. Va.	370	—
	Texas City, Tex.	530	—
	Torrance, Calif.	120	—
	Whiting, Ind.	250	—
Wyandotte Chemicals	Wyandotte, Mich.	30	—
		5,600	1,635

*Include 80 million lbs. stand-by. **Plus 110-million-lbs./year plant at Ponce, Puerto Rico.

U.S. production* of principal ethylene derivatives

(million pounds)

	1955	1956	1957	1958	1960	1965
Ethylene oxide	960	1,080	1,240	1,230	1,440	1,850
Polyethylene	420	566	708	860	1,170	1,700
Synthetic ethanol (million wine gallons)	180	192	198	225	239	273
Styrene	1,014	1,176	1,180	1,213	1,390	1,750
Ethyl chloride**	542	646	600	650	750	900
Ethylene dichloride#	510	613	800	800	870	1,040
Ethylene dibromide	206	218	213	220	280	350

*CW estimates based on government and trade data. **Includes less than 10% produced from alcohol.
#Includes by-product dichloride from ethylene oxide produced via chlorohydrin route.

620 million lbs. above last year's output. In ethylene equivalent, the progression works out to 1.28 billion lbs. in '58; 1.51 billion next year; a shade less than 2 billion in '65.

On the other hand, synthetic ethanol will grow more modestly. Next year, production from ethylene will likely total about 239 million wine gal., rise to approximately 273 million gal. five years later. As a result, ethylene use will increase about 150 million lbs. over the five years.

In the next six years, major plastics and rubber outlets will take more styrene monomer. The market then, including a somewhat depressed export requirement, will come close to 1.75 billion lbs., more than 500 million lbs. above current annual use.

Although competition affecting polystyrene and other styrene-based resins is likely to become more acute (especially from high-density polyethylene and polypropylene), the level of monomer production in '65 translates into an ethylene equivalent of 570 million lbs. Last year's take: an estimated 400 million lbs.

Among the halogenated ethylene products, ethylene dichloride will be first to achieve 1-billion-lbs./year production by '65. That compares with a '59 estimate of 825 million lbs. Prime dichloride growth agents: use in the manufacture of vinyl chloride and in the compounding of tetraethyl lead (TEL) fluid.

Minor uses of dichloride that will also contribute to its growth over the next half-decade or so include Thiokol rubber, ethylene diamine and related products, and applications as a solvent and as a fumigant.

Some 90% of total ethyl chloride production is used in TEL manufacture, with the remainder filtering to ethyl cellulose production and into refrigeration, anesthetic and solvent uses.

Bulk of the chloride that's produced today derives from ethylene, which has, since the early '40s, continued to supplant alcohol as the basic raw material in chloride manufacture.

Based on petroleum industry predictions that TEL consumption by '65 will exceed 750 million lbs., expectations are that ethylene demand for ethyl chloride will climb to well above 400 million lbs.

Ethylene dibromide is also tied to gasoline antiknock additive use, which means total output will grow to some 350 million lbs., compared with 220 million in '58.

Thus, taken together, ethylene requirement for ethyl chloride and ethylene dichloride and dibromide by '65 will total about 760 million lbs./year. Ethylene demand for miscellaneous chemicals other than these three will likely grow from an estimated 80 million lbs. this year to 235 million by the mid-'60s.

These estimates, however, will doubtless prove conservative over the longer-term, as some of the now-minor — and perhaps a few new— ethylene-derived products move toward commercial production.

Karl Ziegler's work in the organic aluminum chemistry field, for example, may well broaden ethylene use several hundred million pounds/year.

Among new U.S. projects based on Ziegler's ethylene-aluminum processes is the just-revealed Texas Alkyls, Inc., plant to be built soon near Houston. The company, a joint venture of Hercules Powder and Stauffer Chemical, will turn out aluminum alkyls, principally triethylaluminum and tri-isobutylaluminum, "in excess of a million pounds/year."

Potential markets for the organometallics include manufacture of polymerization catalysts, straight-chain alcohols and olefins, and use as pyrophoric fuels in ramjet-powered missiles and high-altitude turbojet flame sustainers.

Straight-Chain Outlets: Tabbed as most promising of the potentially big outlets for ethylene are the new higher-molecular-weight straight-chain alcohols and olefins. Continental Oil disclosed last fall that it had "under development" a process, based on Ziegler's aluminum chemistry route, for manufacturing "synthetic" fatty alcohols. Conoco refers to the method as the Alfol process, will hang the Alfol tag on the new petrochemical

Consumption of ethylene in principal derivatives

(million pounds of ethylene)

	Conversion factor†	1955	1956	1957	1958	1960	1965
Ethylene oxide	0.9-1.2	1,050	1,130	1,290	1,280	1,510	1,950
Polyethylene	1.05	422	594	744	903	1,230	1,785
Synthetic ethanol	4.4*	792	845	871	990	1,050	1,200
Styrene	0.33	335	388	389	400**	452**	570**
Halogenated ethylene	0.2-0.5	420	510	545	570	645	760
Other #		31	53	61	72	113	235
Totals		3,050	3,520	3,900	4,215	5,000	6,500

*4.4 lbs. ethylene/gal. 95% alcohol.
**Allowance made for nonethylene-derived styrene.
†Pound of ethylene per pound of product.
#Including oxo alcohols and aldehydes, straight-chain higher alcohols, triethyl aluminum, storage, etc.

alcohols it is planning to produce.

Details won't be available for some time, but it's a safe bet that Continental will be producing the synthesized fatty alcohols by late '60, and later the straight-chain olefins it calls Alfenes. Probable alcohols capacity: 50-100 million lbs./year.

Conoco isn't ready to say where the proposed plant will be located, but several factors point to the Lake Charles, La., area. Petroleum Chemicals (jointly owned by Conoco and Cities Service*) has a 200-million-lbs./year ethylene plant there, and it's operating on refinery gas streams from nearby Conoco and Cities Service refineries. PCI's ethylene plant admittedly now meets requirements of less than 160 million lbs./year (out of a 200-million-lbs./year capacity), and can be readily expanded to some 300 million lbs. annually. The overage would neatly cover Continental's ethylene requirements for the future fatty alcohols and olefins plant.

These, then, are the obvious ethylene growth areas — and there will be others: ethylene-propylene copolymers for use in synthetic rubber and fibers and in plastics; new ethanolamine soaps, syndets; ethylene organometallics for rocket propellents.

As noted previously, ethylene consumption this year may well exceed 4.5 billion lbs., and cumulative foreseeable demand by '65 will likely be on the order of 6.5 billion lbs.

Currently installed or abuilding ethylene capacity serving U. S. markets totals about 5.6 billion lbs./-year *(see table, p. 81)*; an apparent excess amounting to 1 billion lbs. On the basis of realistic growth projections, however, indicating that ethylene demand will increase 300-400 million lbs./year, this surplus capacity will be absorbed by '61-'62.

Historically, the ethylene industry has "overbuilt" by about two years (it takes about that long to get a new plant rolling); and the pattern of preparedness apparently will be followed over the next several years *(see table, p. 84)*. To meet demands anticipated by '65, U.S. producers have indicated that capacity additions totaling 1.64 billion lbs./year will be constructed within a few years *(see table, p. 81)*.

If all such projects are realized, U.S. capacity by '65 will be hiked to more than 7.2 billion lbs., while the need is expected to be 6.5 billion. But some of the ventures may not materialize within that period. In doubt at the moment, but not to be counted out: Union Carbide's Putnam County, West Virginia, expansion of 150 million lbs./year; a 200-million-lbs./year addition to Esso's Baton Rouge, La., plant; a further expansion at Gulf's Port Arthur, Tex., installation (200 million lbs.).

Gulf Coast Big: Of the total U.S. ethylene capacity of about 5.6 billion lbs./year, 63% (a little more than 3.5 billion) is installed on the Texas-Louisiana Gulf Coast. Here, too, are some of the country's largest oil refineries *(see table, p. 85)*.

This concentration has occurred even though chief outlets for the major ethylene derivatives are in the Eastern and Northeastern sections of the U.S. Reason: it's much easier to transport derivatives (e.g., polyethylene, ethylene glycol, styrene, etc.) over long distances than to ship ethylene. Moreover, basic hydrocarbons used as raw materials and fuels are considerably less expensive on the Gulf Coast than elsewhere in the U.S.

Thus, ethylene producing and consuming facilities in that area economically tend to be wholly integrated or built relatively close to each other. In effect, the ethylene industry is raw material-oriented rather than market-oriented.

Of the 28 U.S. plants* currently turning out ethylene, 15 are on the Gulf Coast. And, significantly, nearly 1.2 billion lbs. of the contemplated 1.64-billion-lbs. expansions are slated for this area *(see table, p. 81)*.

Largest of the proposed projects is Mobil Oil's king-size (380 million lbs./year) plant at Beaumont, Tex.

*The two oil companies have long been associated in oil exploration projects, pipelines and refiners and also share ownership (with Mineral Industries and Sears, Roebuck) of Calcasieu Chemical.

*Largest U.S. ethylene producer is Union Carbide with about 30% of total U.S. capacity. Dow is second with 13.5%; Esso, third with slightly more than 11.5%; and Gulf Oil fourth with a shade less than 8%.

Target date for operation: early '61 (*CW, March 14, p. 25*). The unit will be built and operated by Magnolia Petroleum, the Mobil subsidiary for southwestern U.S. First part of the multistaged venture will cost about $25 million and will include storage facilities at Hull, Tex. In addition to ethylene, Mobil will produce butadiene and propylene.

Merchant Ethylene Debut: Gulf Coast companies' preference for ethylene production was nudged significantly by the comparatively recent marketing innovation — merchant ethylene.

Prior to '53, practically all the ethylene consumed was captively produced. Sales then ran about 100 million lbs./year, were confined, for the most part, to deals between companies with close corporate ties (e.g., Esso and Ethyl Corp., Dow and Ethyl-Dow).

At that time, too, an ethylene derivatives producer had to build his own ethylene plant to match his requirements. But while the derivatives installation generally was of economical size, the ethylene need was usually not large enough for the ethylene unit to be a low-cost producer.

The first large merchant ethylene plant (Gulf's, in '53) effectively overcame that problem. Despite some early minor technical difficulties in operation of the plant, Gulf's success proved that the large multicustomer plant filled a vital need of industry.

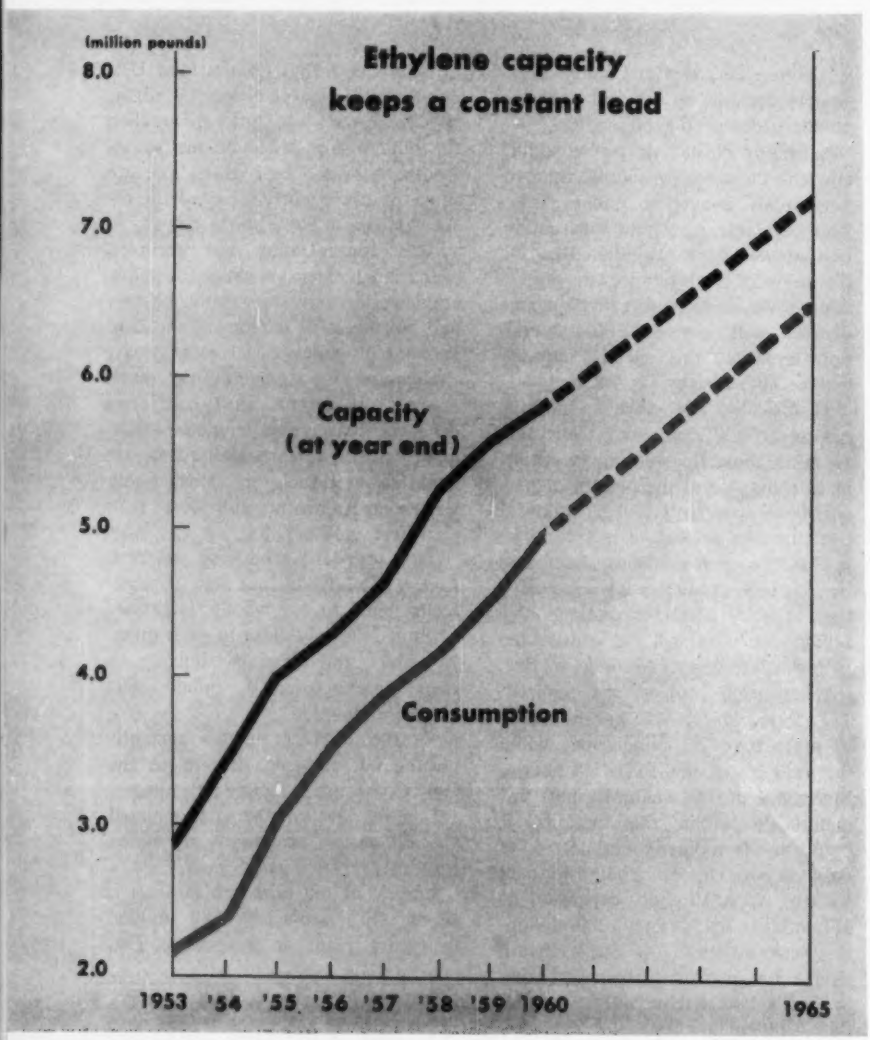
Since '53, much of the new ethylene requirements on the Gulf Coast has been filled by purchased rather than captively made material. As might be expected, polyethylene is the largest outlet for marketed ethylene. More than 45% of the estimated 1.1 billion lbs. of contract ethylene goes into the plastic. Ethylene oxide is second, accounts for only about 23% *(see table, p. 89)*.

Of the total polyethylene capacity, measured in ethylene equivalent (1,438 million lbs.), more than 35% (500 million lbs.) is based on merchant material. And practically all the polyethylene expansions expected to come in by '63 (*CW, April 25, p. 35*) will use purchased ethylene. The reason, of course, is that availability of competitively priced high-purity ethylene is increasing, and such availability cuts down the polyethylene maker's capital investment, since he does not need to build purification facilities to upgrade less-pure ethylene.

(Incidentally, at present, no synthetic ethanol stems from merchant ethylene. Ethylene cost, though relatively low, is still too high to warrant production of alcohol from purchased ethylene.)

Greater ethylene availability, more supply locations—Mobil will join Gulf, Phillips, Esso, PCI and Humble as a major merchant — and an existing and expanding network of pipelines and storage facilities *(map, pp. 86-87)* will continue to give the Gulf Coast an edge in luring new chemical-producing ethylene customers. Among the customers considering new polyethylene plants are Koppers, Allied Chemical, U.S. Industrial Chemicals, Monsanto, Du Pont, and Spencer.

Who Sells: On the Gulf Coast, Carbide, Dow, Du Pont, Jefferson, Monsanto and Shell are predominantly captive ethylene producers, although Jefferson is currently seeking ethylene spot customers to take up a temporary slack in consumption. Phillips, Esso, Gulf, Humble and PCI are merchants.



Gulf heads the list of principal ethylene sellers. The firm's estimated 425-million-lbs./year capacity of 98% ethylene at Port Arthur is reportedly sold to seven contract customers and several spot buyers. Its contract users have a combined requirement, at capacity levels, of about 380 million lb./year *(see table, p. 89)*.

Humble Oil & Refining, latest to enter the ranks of ethylene sellers (with an 80-million-lbs./year plant in '58), has yet to line up commitments for all its present capacity. If the need arose, Humble could expand an additional 100 million lbs./year. At present, Monsanto is Humble's sole ethylene customer, reportedly contracts for up to 35 million lbs./year on a relatively short-term contract.

Petroleum Chemicals' 200-million-lbs./year plant also came onstream in '58, turns out both regular and high-purity ethylene. All its 98% material goes to Calcasieu (for ethylene oxide-glycol) in an over-the-fence deal, while the high-purity product is pipelined to Du Pont's and Spencer's polyethylene plants at Orange, Tex.

Although PCI's commitments currently total only 163 million lbs., and it has an expansion potential of an additional 100 million lbs., most of the company's apparent excess will probably be used, as noted earlier, by Continental Oil for the latter's synthetic fatty alcohols installation.

Phillips' 180-200-million-lbs./year plant at Sweeny, Tex., started producing 98% ethylene in '57. Output is piped to Pasadena (near Houston), and purified, in Phillips' facility there, to 99.85% polyethylene grade. A portion is consumed captively for the firm's polyethylene production and most of the remainder goes to U.S. Industrial and to Celanese for their polyethylene plants that are hooked up by short pipelines with the purification unit at Pasadena.

In addition, Phillips is said to have

How capacity is distributed

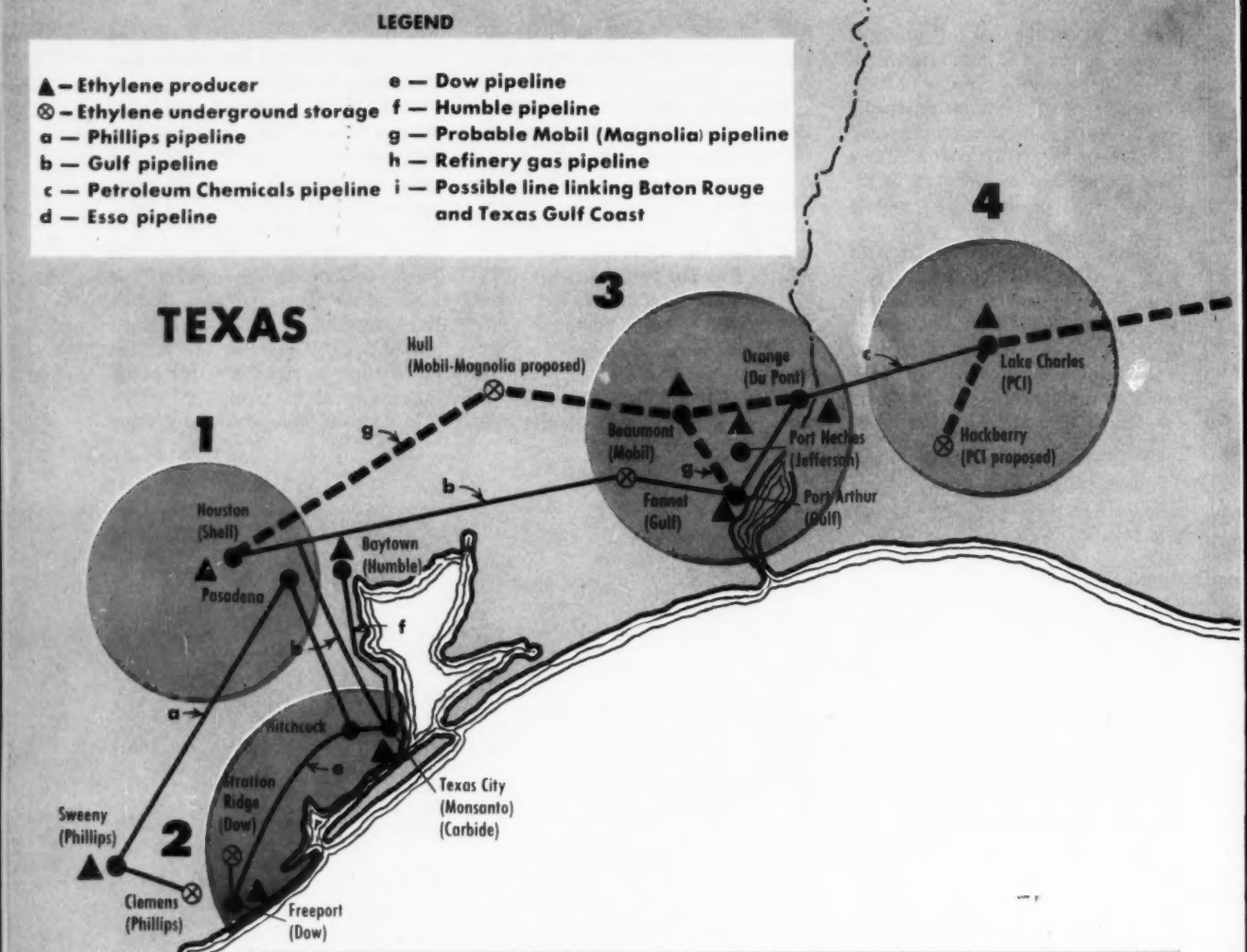
(million pounds)

	Gulf Coast	Central U.S.	East Coast	West Coast	Total U.S.
Installed capacity	3,505	1,070	860	165	5,600
Percent of total	62.6%	19.1%	15.4%	2.9%	100%

Principal ethylene sources

	1958		1965	
	Million Pounds	Percent	Million Pounds	Percent
Refinery gas	1,900	45%	3,050	47%
Natural gas	2,100	50%	3,050	47%
Other (chiefly liquid hydrocarbons)	215	5%	400	6%
Totals	4,215	100%	6,500	100%

Gulf Coast ethylene complex —



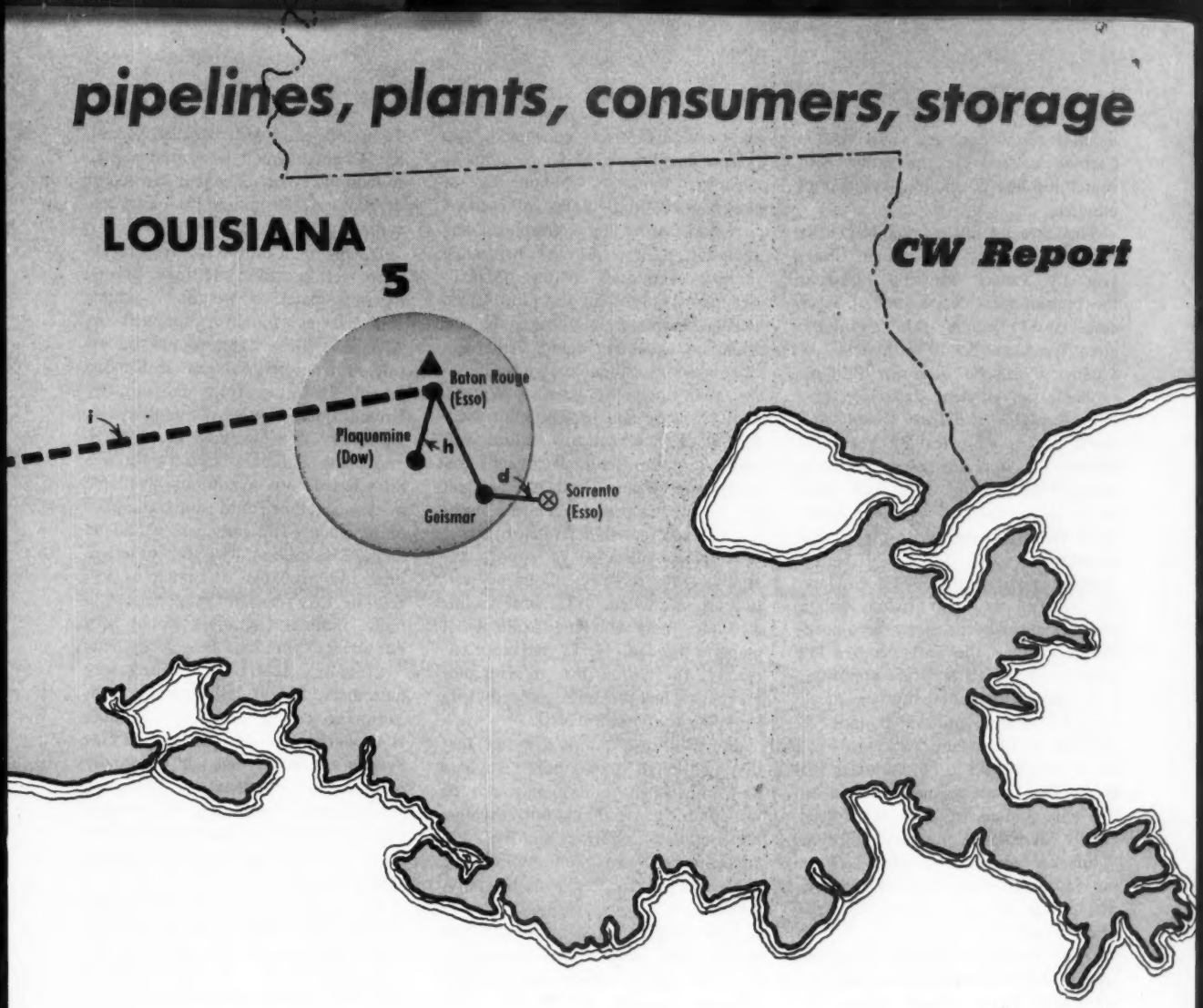
AREA 1

Consumers	*Ethylene outlet*
Celanese (Pasadena)	Polyethylene
Diamond Alkali (Houston)	Ethylene dichloride
Ethyl Corp. (Houston)	Ethyl chloride, ethylene dichloride
Phillips (Pasadena)	Polyethylene
Shell (Houston)	Ethanol, ethyl chloride
U.S. Industrial Chemicals (Houston)	Polyethylene

AREA 2

Dow (Freeport)	Ethylene oxide, polyethylene, ethyl chloride, styrene, ethylene dichloride, etc.
Ethyl-Dow (Freeport)	Various
Monsanto (Texas City)	Polyethylene, styrene, ethylene dichloride, etc.
Union Carbide (Texas City)	Ethylene oxide, polyethylene, ethylene dichloride, ethanol
Union Carbide (Seadrift—not shown)	Ethylene oxide, polyethylene

pipelines, plants, consumers, storage



AREA 3

Consumers	*Ethylene outlet*
Allied (Orange)	Ethylene oxide
Du Pont (Orange)	Polyethylene
Jefferson (Port Neches)	Ethylene oxide, ethylene dichloride, etc.
Koppers (Port Arthur)	Polyethylene, styrene
Spencer (Orange)	Polyethylene

AREA 4

Calcasieu (Lake Charles)	Ethylene oxide

AREA 5

Dow (Plaquemine)	Ethylene oxide
Esso (Baton Rouge)	Ethanol
Ethyl Corp. (Baton Rouge)	Ethyl chloride, ethylene dibromide
Foster Grant (Baton Rouge)	Styrene
Grace (Baton Rouge)	Polyethylene
Wyandotte (Baton Rouge)	Ethylene oxide

a short-term contract with Union Carbide to provide the latter with something like 20 million lbs./year of ethylene.

The Sweeny plant can be easily expanded about 110 million lbs./-year by adding cracking furnaces; the present purification unit at Pasadena could handle this additional quantity. About 35-40 million lbs. of expansion will be used for Phillips' probable polyethylene expansion (*see CW Report, "Ethylene Chemicals," April 25, p. 35*), leaving about 70 million lbs. for increased merchant sales. (This amount may well head for U. S. Industrial's proposed polyethylene expansion at its plant near Houston.)

An evaluation of Esso's ethylene potential at its giant Baton Rouge complex must of necessity be a speculative one — the variables are too great to assure an accurate appraisal. For years, the company produced several hundred million pounds of ethylene by the steam cracking of gas oil, a process said to be unique in the U. S. The resulting material had an ethylene content of 65%, was used chiefly for ethanol and ethyl chloride.

But to remain competitive, Esso put in purification facilities for producing up to 300 million lbs./year of 99% ethylene.

Esso's long-term-contract customers on the Gulf Coast, the trade believes, are Ethyl, Foster Grant, Grace and Wyandotte. The combined take-off, at capacity levels of operation, probably comes to some 250 million lbs./-year, leaving a balance of approximately 50 million lbs. uncontracted for.

Esso's steam-cracking operations can yield nearly 700 million lbs./-year of contained ethylene. Subtracting the 300 million lbs. of potential merchant ethylene and allowing for a captive use (in alcohol manufacture) of some 185 million lbs. indicates an unused reserve of about 200 million lbs./year of ethylene capacity.

Ethylene Elsewhere: Until last year, when Esso came onstream with a merchant ethylene plant at Bayway, N. J. (after some production difficulties), the Gulf Coast was the only area in the U.S. in which ethylene was available for general sale. In fact today, except for the Bayway output and Gulf Coast merchant plants, all other ethylene produced in the U. S. is captively consumed. The present breakdown of U. S. ethylene capacity: about 1.5 billion lbs. of merchant, 3.4 billion lbs. of captive.

(Underscoring this geographical consumption pattern are the two most recently proposed plants. Mobil's Beaumont output on the Gulf Coast will be completely merchant ethylene, while on the other hand, American Chemical's estimated 80-million-lbs./year upcoming plant at Watson, Calif., will be captive. The joint Richfield-Stauffer Chemical venture will make ethylene from Richfield's refinery gas streams, and the product will be further processed into a number of chlorinated derivatives.)

Esso is contracted to supply annually, from Bayway, about 66 million lbs. of ethylene to General Aniline & Film's new ethylene oxide-glycol plant at Linden, N. J., and approximately 32 million lbs. to Hercules Powder's low-pressure polyethylene installation at Parlin, N. J.

Hercules' use points up the fact that, although 99% pure ethylene (an in-between grade) may not be suitable for conventional polyethylene, the contained impurities and the 99% concentration are well within the tolerances set for low-pressure polyethylene.

According to trade sources, a few refiners and natural gas companies have considered setting up merchant ethylene projects outside the Gulf Coast. Among them: Sun Oil at Marcus Hook, Pa.; Tidewater Oil at its large refinery at Delaware City, Del.; Oronite at Perth Amboy, N. J.; Sinclair-Indiana at Chicago. Another is Sohio, which splashed into petrochemical news recently with its plans for a propylene-ammonia acrylonitrile plant at Lima, O.

But their ideas haven't materialized, reportedly for one main reason: customers to provide the base load for such plants have been hard to come by because of competition from Phillips, Esso and other Gulf Coast ethylene merchants. Another damper: prospective customers (unlike venturesome Hercules and General Aniline) are leery about tieing into only one supply source when several are available.

But at least one ethylene project outside the Gulf Coast may crystallize. Columbia Gas System, Inc., is actively seeking ethylene customers for a long-proposed plant at Siloam, Ky. Chances are it will build a 200-million-lbs./year plant if it can secure at least one 70-million-lbs./year consumer for its product.

Details of Columbia's project are fairly well known in the trade. Briefly, its raw materials would be ethane and heavier fractions supplied by Allegheny Gas. These would be extracted from natural gas at Kenova (about 35 miles from Siloam), by United Fuel, another Columbia Gas subsidiary, and pipelined to the ethylene plant. Ultimate capacity for olefins based on maximum available materials (ethane and ample supplies of liquefied petroleum gas) would be some 350 million lbs./year of ethylene, and probably as much as 130 million lbs./year of propylene. Initially, though, Columbia would turn out about 200 million lbs. of ethylene.

Columbia hasn't yet signed any customers, but at last month's dedication of a new plant of Columbia Hydrocarbon — also a Columbia Gas System subsidiary that will eventually produce the ethylene — Columbia Hydrocarbon President C. E. Loomis expressed the hope that "such a company or companies [ethylene customers] will soon be found."

The ambitious firm will have mine-cavern storage for propane and butane. Underground storage is unsuitable for ethylene, so the company is also planning aboveground storage for approximately six days' production of ethylene.

Pipeline Advantages: At present, Gulf has the longest pipeline, about 140 miles. It starts at the company's Port Arthur refinery, goes first to Port Neches, then branches eastward and westward. One branch serves a cluster of ethylene customers (Allied Chemical, Du Pont, Koppers and Spencer) in the Orange-Port Arthur area. Running west, the line connects into Gulf's Fannett salt-dome storage, goes on to the important Houston ethylene-consuming area, then turns south to Texas City.

Gulf's pipeline and storage system, however, now operates on regular (98%)-grade ethylene, could not, of course, simultaneously handle polyethylene-grade material. Thus, Gulf customers who need high-purity ethylene until now have had to install purification units.

(Chances are, though, that Mobil's

Merchant ethylene: end-use pattern by outlets

(million pounds)

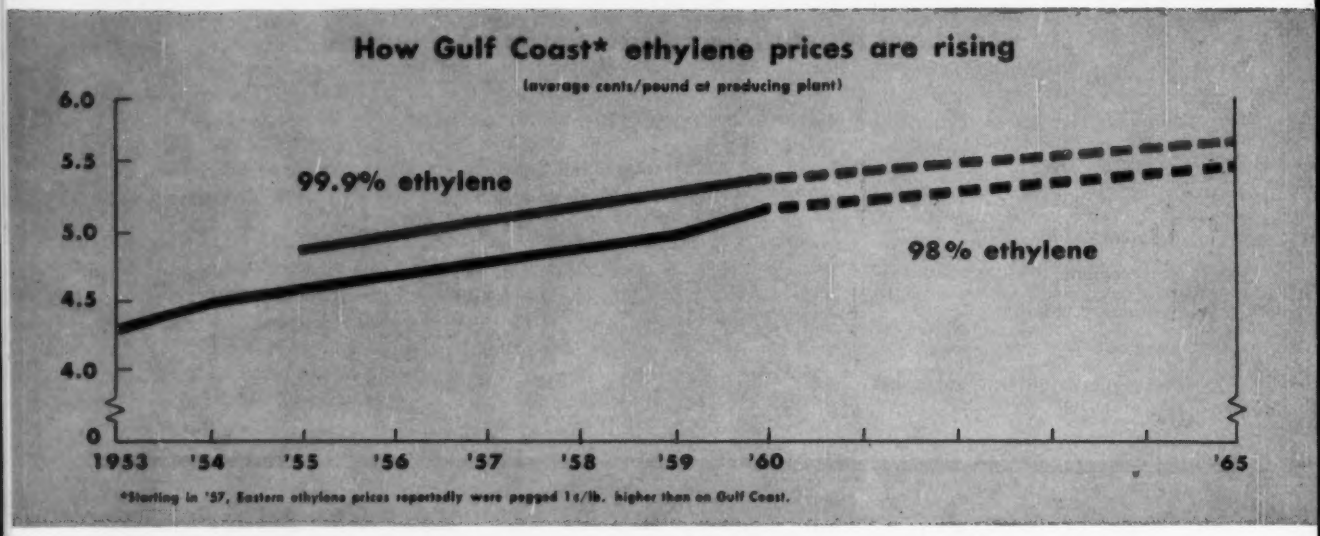
Outlet	Installed Capacity (ethylene equivalent)	Ethylene Consumed
Ethylene oxide	1,649	255
Polyethylene	1,438	500
Synthetic ethanol	1,078	0
Styrene	500	120
Halogenated ethylene and others	420	225
	5,085	1,100

Merchant ethylene: who contracts for how much . . . from whom

(million pounds, estimated)

Customer	Suppliers* Gulf	Esso	PCI	Phillips	Humble
Allied Chemical	38	—	—	—	—
Calcasieu	—	—	66	—	—
Celanese	—	—	—	42	—
Diamond Alkali	21	—	—	—	—
Du Pont	90	—	50	—	—
Ethyl Corp.	65	100	—	—	—
Ethyl-Dow**	—	—	—	—	—
Foster-Grant	—	35	—	—	—
General Aniline & Film	—	66	—	—	—
Grace	—	52	—	—	—
Hercules Powder	—	32	—	—	—
Koppers	69	—	—	—	—
Monsanto	50	—	—	—	35
U.S. Industrial Chemicals	—	—	—	79	—
Spencer Chemicals	47	—	47	—	—
Union Carbide	—	—	—	20†	—
Wyandotte Chemicals	—	66	—	—	—
	380	351	163	141	35

*In addition, suppliers sell some ethylene on a spot basis, about 50 million lbs./year now. **Buys an estimated 30 million lbs./year from Dow. †Probable.



recent bid for a share of the growing high-purity market, will spark an upgrading of currently offered 98-99% ethylene. Gulf may be contemplating such a move.)

Actually, PCI's comparatively short (33-mile) line from Lake Charles to Orange and Phillips' stretch from Pasadena to Texas City are the only existing polyethylene-grade pipelines. (Phillips' storage is at the Clemens dome; PCI may build storage at Hackberry, La.)

Humble pipes its ethylene south to Texas City, while Dow's line heads toward the same general area from its Freeport plant and Stratton Ridge salt-dome storage facility.

In the Baton Rouge area, most ethylene consumers are located near Esso's refinery, but the company also has a relatively new 16-million-lbs. storage dome at Sorrento, La.

Links Lacking: But despite the Gulf Coast's extensive pipeline and storage network, two major disadvantages exist: (1) there is no link for high-purity ethylene between the chemical industry concentration in the Port Arthur - Orange - Beaumont and the Houston-Texas City consuming areas; (2) Baton Rouge is an isolated ethylene island.

There is trade speculation that a couple of companies have weighed the economics of building a line from Baton Rouge to Texas' ethylene-using areas; plans may soon materialize.

Firmer, perhaps, is the likelihood that Mobil will run a high-purity line (99.9%) from the proposed Beaumont plant westward to Houston and Texas City, east to Orange, and south to Port Arthur *(CW, March 14, p. 25)*.

If Gulf were to switch to the higher-purity ethylene, its long pipeline could very well be used as a common carrier. But such an eventuality would call for much planning.

But while pipelines and storage facilities are important factors in the Gulf Coast ethylene complex, raw-material sources are also key factors.

Raw Materials: Of the ethylene produced in the U.S., about 95% comes from refinery gas and natural gas *(see table, p. 85)*. Cracking operations at refineries yield sizable quantities of by-product ethylene, as well as ethane and propane, which are pyrolyzed to make more ethylene.

Most ethylene-producing chemical companies (as distinguished from petroleum firms) rely on natural gas feedstocks such as ethane, propane and butane for their raw material. (Some companies, Union Carbide, for instance, use both natural gas and also tie in to refinery gas sources.) In recent years, natural gas transmission lines have played an important part in increasing the availability of this source of ethylene.

Other ethylene raw materials include natural gasoline, light refinery fractions, gas oil, etc., and nonpetroleum sources such as coke-oven gas and ethyl alcohol. The latter two are negligible sources in the U.S., although much coke-oven gas is used by European ethylene makers.

Use of liquid hydrocarbons (e.g., natural gasoline) depends on the value a refiner attributes to the many by-products obtained, including gasoline, aromatics, liquefied petroleum gas, propylene and butylenes.

Last year, refinery gas produced approximately 1.9 billion lbs., 45% of the ethylene made in the U.S.; natural gas yielded about 2.1 billion lbs., 50% of the total. All other sources, chiefly liquid hydrocarbons, accounted for slightly more than 200 million lbs., about 5% *(see table, p. 85)*.

One trade analyst predicts that by '65 refinery gas will match natural gas as a source, account for a little more than 3 billion lbs. of the U.S. ethylene produced for chemical use.

(These figures concerning ethylene sources are intended to indicate merely the relative importance of the principal feedstocks, since many large ethylene plants are designed to operate on a variety of raw materials.)

C_2 Comes Out on Top: The C_2 fractions (ethylene and ethane) in refinery gas streams are perhaps the cheapest of the ethylene raw materials. In the typical refiner's economy, for instance, such off-gases have an alternate fuel value of only about ½¢/lb., compared with LP-G's 1¢.

Cost of ethylene from refinery gas

(Gulf Coast location; typical 200-300-million-lbs./year plant)

Item	Cents/pound of ethylene	Cost as percent of selling price
Net* raw material (refinery gas stream)	0.4	8%
Fuel	0.4	8%
Labor and materials	0.9	18%
Fixed charges (insurance, depreciation)	1.0	20%
Total cost of manufacture	2.7	55%
Income tax	1.2	
Return on investment	1.0	
Total selling price (f.o.b., plant)	4.9	

*Raw material cost, less fuel gas and other by-product credits.

A study of Gulf Coast refineries indicates that, at present, a large part of the available off-gas C_2 feedstock is committed, i.e., being used or sold for ethylene manufacture. In fact, so little uncommitted material is available, at least two major ethylene merchants are said to be using more-expensive propane as a supplement.

Humble and Esso may be the only two Gulf Coast refiners with a large enough C_2 reserve on which to base economically feasible ethylene expansion. It's unlikely, though, that either would build additional plants or pipelines into new marketing areas unless new customers were signed.

Mobil's upcoming 380-million-lbs./-year installation, say trade observers, may well be the Gulf Coast's last big ethylene venture based on off-gas streams.

There are other C_2 streams available, of course—Sinclair at Houston, Pure Oil at Nederland, Tex., Atlantic at Port Arthur—but quantities at these refineries are not sufficient to warrant an economic ethylene plant.

Hence, it would appear that any major Gulf Coast ethylene expansion (other than by Humble, Esso or at the new Mobil plant) would have to depend to a large extent on raw materials other than C_2 fractions.

Octane Push? But it's difficult to ascertain how new processes, such as Universal Oil Product's Molex, will affect the present or future supply of relatively inexpensive ethylene raw material.

UOP suggests that normal paraffins can be readily removed from gasoline to achieve octane improvement, which raises a problem: how to dispose of the resulting normal paraffins. They could be isomerized to isoparaffins, which have a higher octane, and put back into the gasoline. But the entire cost of the operation must then be charged to gasoline manufacture, for which the refiner would get little or no return. But the octane race still shows no sign of abating—pressure on refiners is to continue raising octane ratings just to remain competitive in the gasoline market.

UOP claims that with its new process for separating normal paraffins from hydrocarbon mixtures continuously, the paraffins could be used as stock for high-temperature pyrolysis to make ethylene and other intermediates.

In this way, presumably, refiners could credit the resulting ethylene, propylene, butadiene, and other by-products, such as benzene, with the gasoline octane improvement. Under this setup, normal paraffins could be considered a less costly feedstock than other raw materials.

It's probable that some petroleum ethylene makers will adopt the UOP process to tie their ethylene manufacture to octane-level improvement projects, thus bettering their position in the ethylene market.

Contracts and Prices: As merchant ethylene becomes more important in the ethylene industry, contract conditions, including prices, will bear closer scrutiny.

Gulf set patterns for ethylene contracts on the Gulf Coast that have been followed in varying degrees by other merchants. All, for example, provide for minimum ethylene purity and concentrations; most apply escalation factors to a base price.

When Gulf set an ethylene selling price (4¼¢/lb., f.o.b., producing plant) in the fall of '50, it was escalated to maintain a relatively constant profit from the ethylene operations. Three factors were used: crude oil, for raw material; labor; commodity prices based on the Bureau of Labor Statistics (BLS) commodity price index.

Some typical variations that have developed since then: instead of crude as the basis for raw-material escalation, Phillips is said to be using regular gasoline, with Humble using a combination of crude oil and natural gas. Most sellers have adopted the BLS average hourly rate for production workers in the refining industry as a basis for escalating labor cost, while Gulf uses the average labor rate in its own refinery.

Other contract conditions generally cover the length of the contract (usually 5-10 years, although some are for 3-5 years); quantity limits and penalty charges, in some instances; and transportation charges.

Ethylene transportation charges vary, of course, are usually tacked on to the base f.o.b. producing plant price. Trade sources indicate that Gulf charges about ¾¢/lb. of ethylene for each 100 miles of pipeline travel. Other firms, such as PCI, charge slightly less, and Esso is said to make no shipping charge for customers on its pipeline route. Humble is also believed to charge nothing for delivery into the Texas City area.

As competition becomes more acute, there's a good possibility, some say, that ethylene marketers will alter their pricing practices. Equalization of prices with the nearest producing point may become common in the next few

years, and the longer-term trend may be toward quoting a flat delivered price.

How to Price? It's beyond the scope of this report to thoroughly define the intricacies of ethylene pricing. But to get an idea of what's ahead in price trends, especially on the Gulf Coast, consider the simplified cost analysis of ethylene production at a hypothetical 200-300-million-lbs./year plant using typical C_2 refinery gas stream fractions *(see table, p. 91)*.

Net raw-material cost (i.e., refinery gas stream less fuel gas and other by-product credit) is about 8% of the final ethylene f.o.b. selling price. Fuel, labor, materials (other than raw materials) and fixed charges, such as insurance and depreciation, bring the total cost of manufacturing to about 2.7¢/lb., 55% of the selling price.

To this must be added tax and a reasonable profit, to arrive at an average selling price of near 5¢/lb. for regular-grade (98%) ethylene. Few in the industry believe, however, that ethylene will, over the next few years, remain at that level; it has been uptracking since the early '50s.

For example, cost of materials other than raw materials may be expected to rise about 3%/year; and labor cost—if current wage negotiation patterns don't change—may rise at an even higher rate.

For new ethylene producers, cost of constructing plants—and, concomitantly, the fixed charges—are also certain to continue moving higher.

There are a few possible cost-modifiers, however, that would tend to slow the price increase rate: technological improvements in ethylene manufacture, larger plants—and the likelihood that merchants will have to absorb part of the anticipated price increases to stay competitive.

Taking into consideration all these factors, it would appear that ethylene consumers, by '65, will be paying at least an average of 5.5¢/lb. for regular grade, and perhaps 5.7¢/lb. for high-purity material *(see chart, p. 90)*.

Any increase in raw-material cost, however, would significantly alter the entire cost picture. For example, by substituting higher-priced propane for C_2 components of the refinery gas, the net raw-material item would increase from 0.4¢/lb., to 1.3¢. Assuming that fuel, labor, other materials and fixed charges remain identical, cost of manufacturing ethylene would jump from 2.7¢/lb., to about 3.6¢. To maintain the same selling price, ethylene producers' profit would drop 0.4¢/lb.

Ethylene Sum-up: Despite current surpluses, more than a billion pounds of ethylene-producing capacity *(see table, p. 81)* will be needed in the U.S. to meet projected '65 demands for polyethylene, ethylene oxide and glycol, styrene and other derivatives.

As indicated earlier, some of the major plant expansions may not be completed in time to meet the anticipated '65 demand. But chances are good that most of the currently dubious ethylene projects will eventually be realized, thereby maintaining the industry's planned "overbuilt" pattern.

But even if all the now-speculative plants are constructed and push the industry's '65 ethylene potential to nearly 7.3 billion lbs./year — as against an estimated consumption of only 6.5 billion — the excess will likely be absorbed, say market analysts, by '67 or '68.

In this expansion, the Gulf Coast, as noted, will continue to play the dominant role. And much of the anticipated requirement increases will doubtless come from merchant ethylene producers.

Whether ethylene complexes rise in other sections of the U.S. is, at this time, still speculative.

As noted (*see table, p. 85*) the Gulf Coast will have nearly 63% of the total U.S. installed ethylene capacity by the end of this year. Central U.S. will be a poor second, with 19%. The East Coast currently boasts a total ethylene capacity of 860 million lbs. (approximately 15.4% of the total U.S. figure), but its share may change if new ethylene customers materialize.

The export market may spawn some problems for ethylene users and, indirectly, ethylene sellers. In some fields — e.g., polyethylene and synthetic rubber — growing foreign production will, to some extent, displace U.S. material in European markets. But, even in this potentially gloomy area, there's a silver lining. Exports could rise again within a few years, as demand for these products climbs in countries not large enough to support economic facilities of their own.

Taken as a whole — demand, production, capacity — this conclusion stands out: the U.S. ethylene industry is contributing — and will continue to contribute — a major share of the over-all chemicals surge to '65.

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Next Week: Sulfur—its changing production, market patterns.

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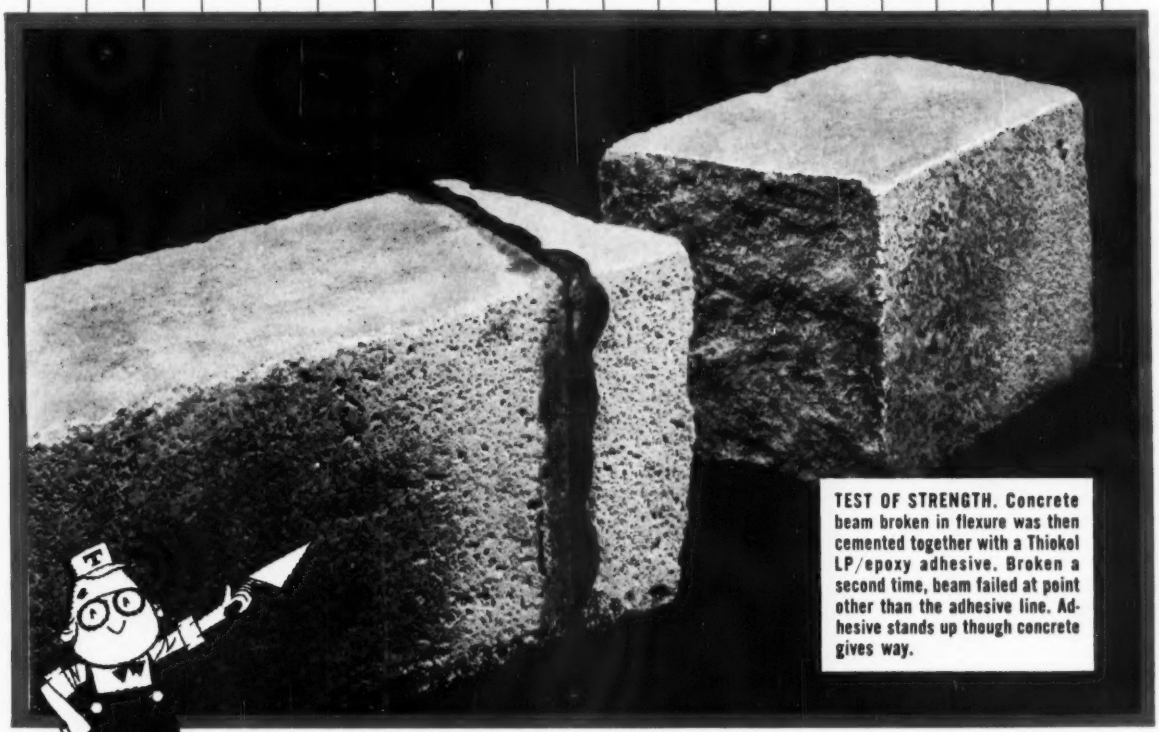

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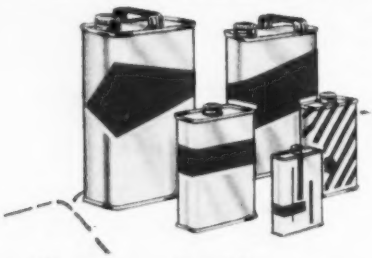

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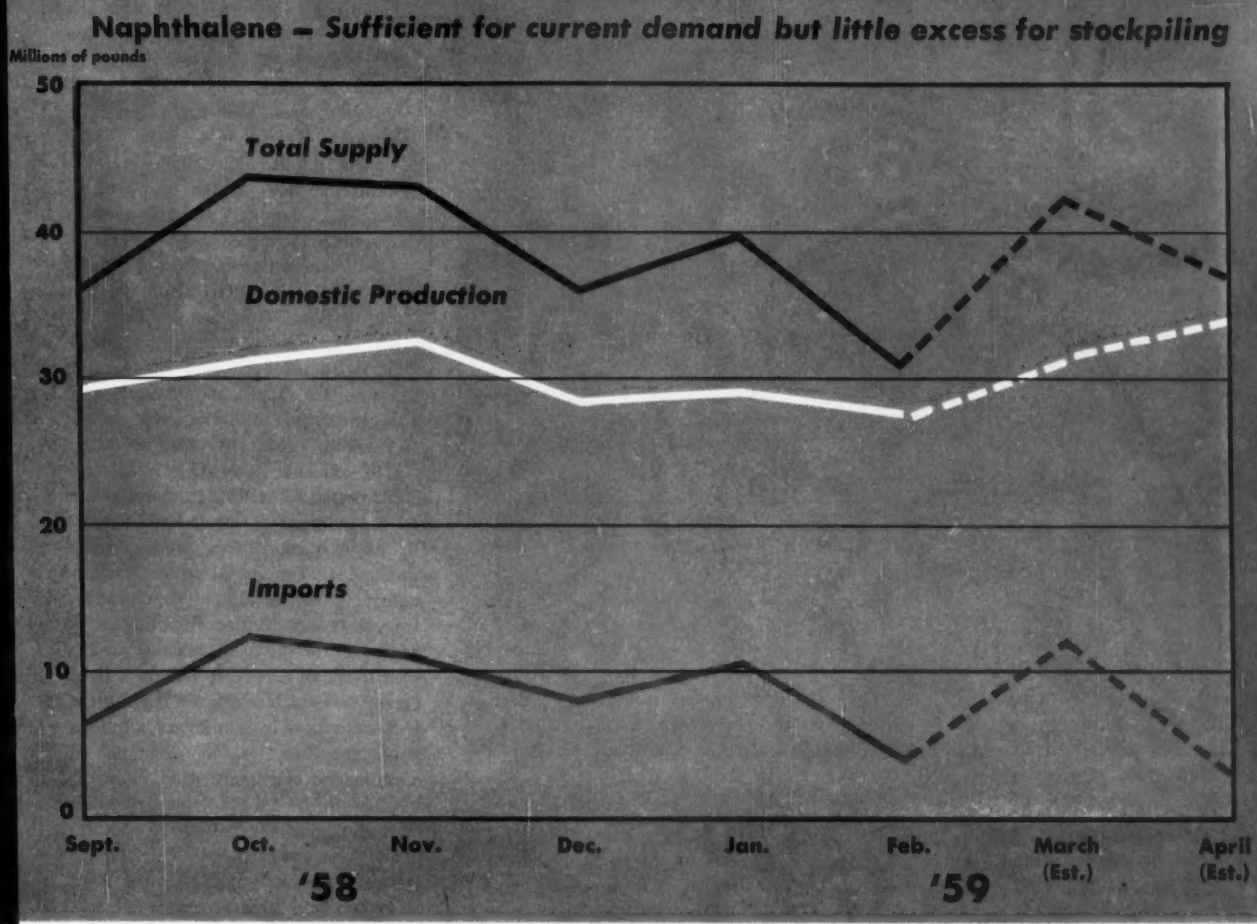


Easing the Squeeze on Naphthalene

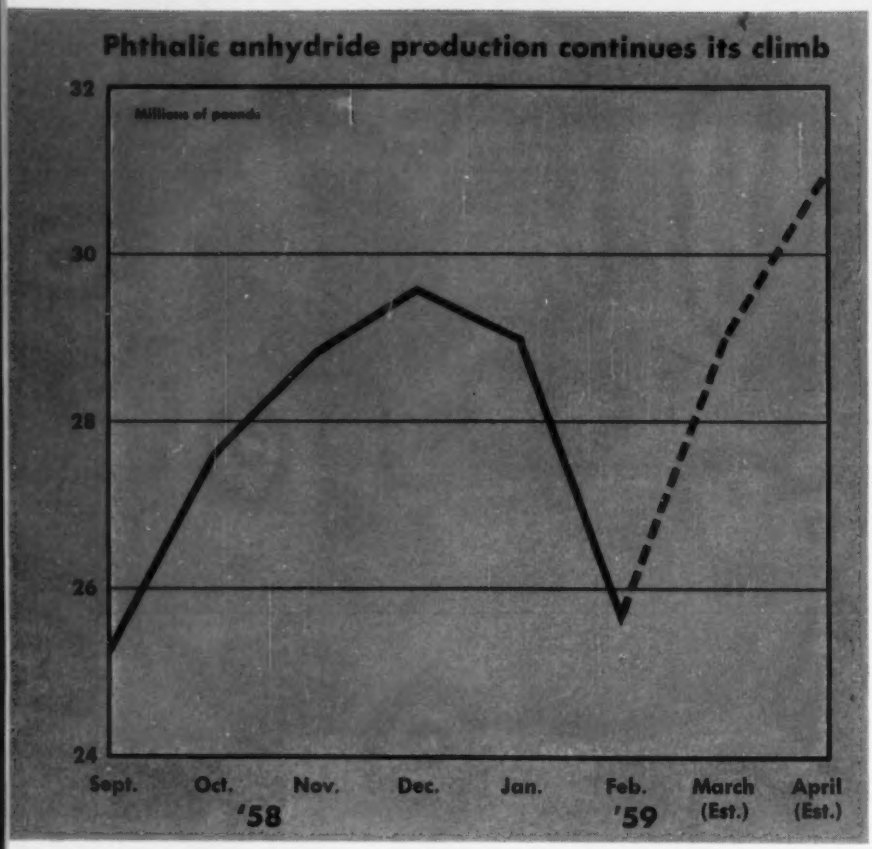
By last week, naphthalene consumers were beginning to see their way out of a tight supply position. They were, for the most part, able to get their hands on their day-to-day needs — but they were having trouble rebuilding inventories. Now, in spite of threats of a potentially disruptive steel strike, purchasers are not particularly worried about a cutoff — although the days of really free supplies are still distant.

Causing the naphthalene problems are four main factors: increasing demands for rebuilding depleted inventories; increasing demand for naphthalene-derived phthalic anhydride; low imports of the compound during February; and fires at two U.S. plants.

The first two factors are closely related. Normal naphthalene inventory buildup had been neglected because buyers expected a sharp price cut. This cut seemed likely, they felt, since tabs on phthalic anhydride — into which 80-85% of U. S. naphthalene goes — were apparently tumbling from 21¢/lb. to 17¢/lb. (*CW Market Newsletter, Aug. 2, '58*). And this latter price cut was due to the Amoco Chemical's offers of phthalic from its under-construction plant at the 17¢/-lb. price.

Amoco's phthalic was not to be naphthalene-derived, nor were the quantities offered large enough to meet more than a fraction of U. S. needs. More important, no phthalic was actually available at 17¢/lb. But it nonetheless convinced naphthalene buyers that the chemical they wanted would soon drop in price, and they decided to fill only their immediate needs; to wait to build inventories until the reductions came.

They were taking a chance; their inventories had been allowed to dwindle because of the recession of '57-'58. And the phthalic anhydride business—with the material at 21¢/lb. — started on a steady upswing. Keeping up with phthalic production, naphthalene output rose steadily, too — on a pound basis, it was about 1.25 times that of phthalic. It takes about 2,500 lbs. of the raw material to make a ton of phthalic. Clearly,



little naphthalene went into stockpiles at the consumer's level.

Then, in Dec. '58, fresh reports of impending naphthalene price drops prompted consumers to dip into already-tight inventories (*CW Market Newsletter, Dec. 27*). By early '59, they were working on minimum inventories.

Then, in mid-January, Monsanto slashed phthalic prices 20% to the long-talked-about 17¢/lb. level; almost immediately, Koppers led the way toward reducing naphthalene tabs to 5¢/lb. Other producers followed swiftly (*CW Market Newsletter, Jan. 31*).

Buyers were quick to take advantage of the new low price for U. S. material to rebuild inventories. They neglected imported material, which was also 5¢/lb., a price that did not include the cost of debagging, remelting, and transportation, or take into account evaporation losses.

Meanwhile, Amoco's plans remain nebulous. At press time, Amoco could not tell *CW* definitely when its phthalic plant will be onstream.

Triggered by Fire: Then, in February, fires at two important plants touched off reports that there was a shortage at hand; a rumor brought to life by reductions in availability of "neglected" naphthalene from abroad (imports were at a seven-month low).

U.S. Steel's plant at Gary, Ind., one of the largest in the country (estimated capacity of 4.5-5 million lbs. naphthalene/month) was one fire casualty. Koppers' tar unit at Follansbee, W. Va., was also fire-damaged. But the Koppers plant was restored to production within one week, and by now, U.S. Steel is in partial production at Gary. It is already making naphthalene shipments, and operations are rapidly returning to normal.

Naphthalene imports in February amounted to about 3.6 million lbs. Thus, at a time when naphthalene demand was rapidly increasing, total supply was being seriously cut back.

By March, purchasing agents, threatened with a steel strike in four short months, were looking around to buy all the material they could lay their hands on. Worry of a steel shutdown had also triggered some panic buying of phthalic anhydride. Traditionally, in a period of plenty, phthalic consumers will work along with 30-45-day inventories, but at the first hint of shortages, users will try to build inventories to 60-day—even 90-day —levels. Chances are, however, that should the steel ruckus drag out for even 30-45 days, no phthalic consumers will be strapped for supplies.

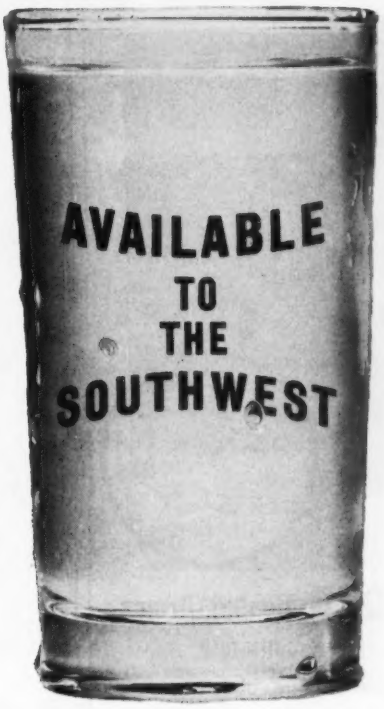
With domestic supplies tightening, consumers are once again turning their attention to foreign suppliers, but with little satisfaction. Although no official quotes are being made, indications are that naphthalene tabs for imported material are about 5-5½¢/lb. (generally, they are about 1¢/lb. cheaper than U.S. material).

Although some foreign material will be brought in, as importers continue to fill existing orders, trade reports indicate that material above current contracts will be difficult to come by. Importers say foreign naphthalene is not plentiful this year because of the slowdown of the European business economy (which has been lagging the U.S. recession by about six months). And, they say, large amounts of naphthalene are being used by overseas countries to take care of their increasing phthalic anhydride requirements (*see table*).

Can domestic suppliers take care of present naphthalene requirements? Yes, according to many industry observers. Existing facilities and inventories for coal tar and naphthalene should stand phthalic anhydride producers in good stead through a steel strike of four to six weeks' duration. One reason: heavy imports of naphthalene during March (estimated at 12 million lbs.) helped relieve some of the tightness in the domestic market. And increasing steel production has resulted in a steady rise of coking operations. The higher rate of coke production, forcing use of higher temperatures and shorter coking cycles, means a higher percent of naphthalene in the coal tar.

Even during a steel strike, tar distillers, e.g., Allied Chemical, Koppers Co. Inc. and Reilly Tar and Chemical Corp., would still be able to produce naphthalene from coal-tar inventories which are high at present. At the same time, it's probable that demand for

NEW FERRIC SULPHATE SUPPLY



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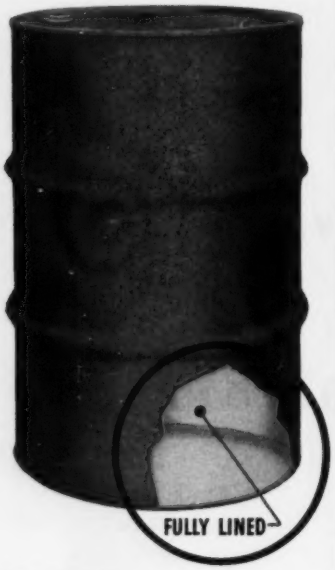

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Worldwide Phthalic Anhydride Capacities

(Million pounds, estimated)

Country	1955	1959
West Germany	77	110
East Germany	13	40
England	55	75
Italy	38	65
France	37	50
Sweden	4.5	5.5
Austria	4.5	6.5
Spain	n.a.*	2.5
Belgium	13	13
Denmark	n.a.	2
Switzerland	2	3
Canada	n.a.	20
Japan	n.a.	50
Australia	n.a.	6
Brazil	n.a.	3.5
Argentina	n.a.	4
South Africa	n.a.	3
Mexico	n.a.	2
Russia	n.a.	n.a.
Poland	n.a.	n.a.

*n.a.—not available

both naphthalene and phthalic anhydride would fall off because a steel strike would—by depressing the general economy—indirectly hit consumers of these chemicals.

However, an extended steel strike would play havoc with the naphthalene industry, as well as most of the economy.

If the steel strike is averted, supplies of both phthalic and naphthalene could be more than adequate to handle normal requirements. Depending on how much inventory is put into stockpile by July, it is possible that the third quarter will bring a surplus of both chemicals. There's also the factor of a third-quarter seasonal dropoff in requirements, due to vacations and plant shutdowns.

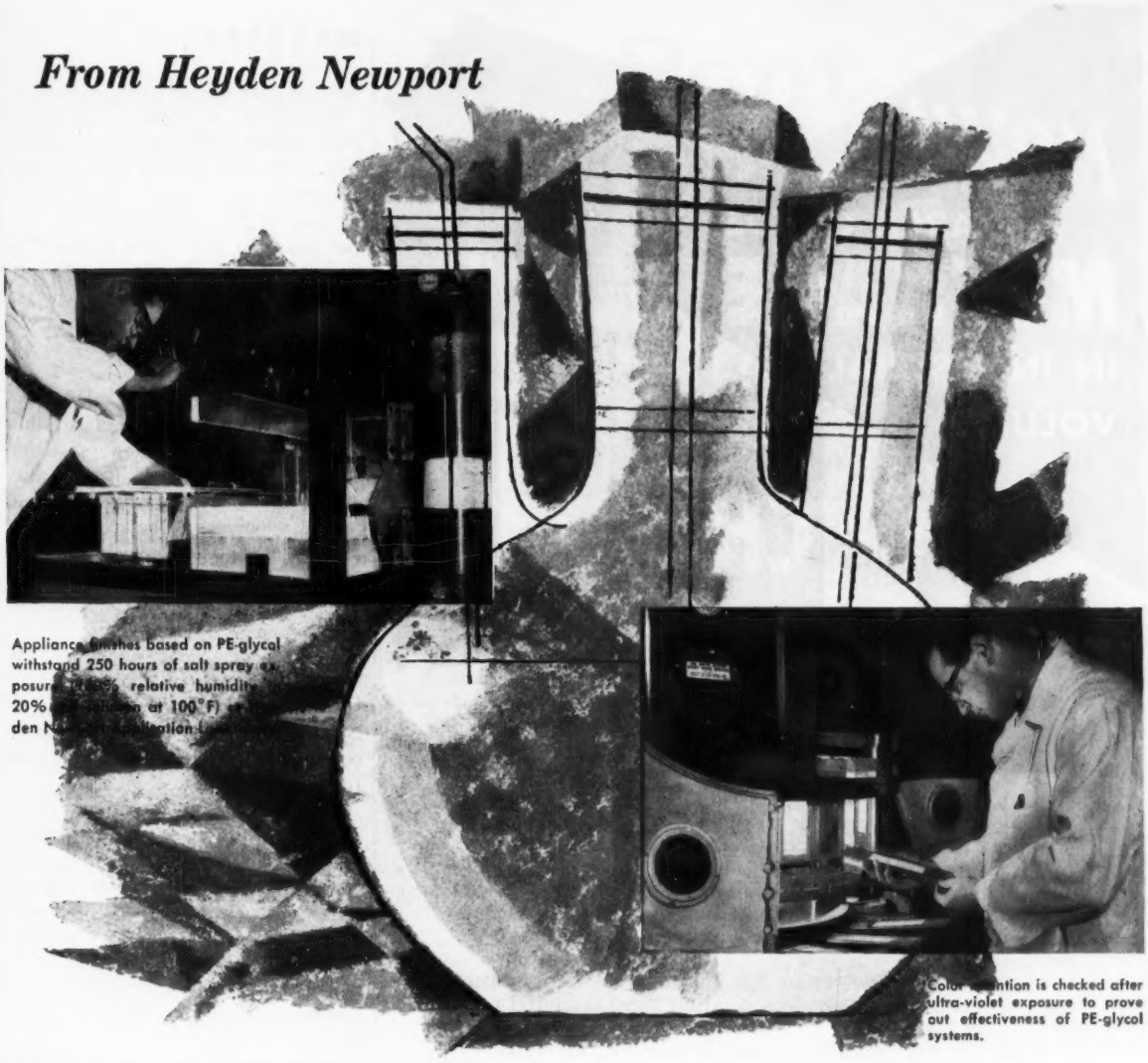
In any case, whether or not inventories can be built up seems to be the most significant factor concerning naphthalene supplies.

Reds Using More Zinc

Worldwide production of primary zinc metal, excluding that in the U.S., has shown a steady increase over the past three years. Fastest-growing producers have been the Communist bloc countries, causing some concern among world industry leaders about the possibility of dumping zinc in world markets.

But these fears are offset somewhat by Russia's growing needs. R. Lewis Stubbs, director of the Zinc Development Assn., London, told the American Zinc Institute meeting at Chicago last week that Russia's enormous potential for zinc products will consume most of the new production. At present, Russia (with a population about three times that of the U.S.) consumes about 4 lbs. of zinc on a per-capita basis, while the U.S. rate is about 10 lbs. It is believed that this figure will

From Heyden Newport



Appliance finishes based on PE-glycol withstand 250 hours of salt spray exposure at 95% relative humidity, 20% [illegible] at 100°F) at Heyden Newport Application Laboratory.

Color retention is checked after ultra-violet exposure to prove out effectiveness of PE-glycol systems.

Three new areas of PENTAERYTHRITOL application

Pentaerythritol is gaining new importance to paint chemists and allied chemical specialists as a result of development work at Heyden Newport. Check these three new areas that can be of profitable interest to you.

ALKYD EMULSIONS. The application advantages of latex paints plus the outstanding properties of the alkyd system is a combination offering formulators new sales potentials. Data are now available on the formulation and processing of PENTEK® based alkyd emulsions, excellent vehicles for water-based flat wall paints and industrial primers.

IMPROVED ALKYDS FOR FLAT PAINTS AND INDUSTRIAL FINISHES. Medium and short oil alkyd formulations — taking advantage of high quality, low cost PENTEK-glycol combinations — can be processed in standard equipment. Details on formulation and processing are available.

NEW HORIZONS. Pentaerythritol and its esters are finding increasing use in intumescent coating, plastic stabilizer, and plasticizer applications. Certain pentaerythritol derivatives are now showing considerable promise as lubricants and functional fluids.

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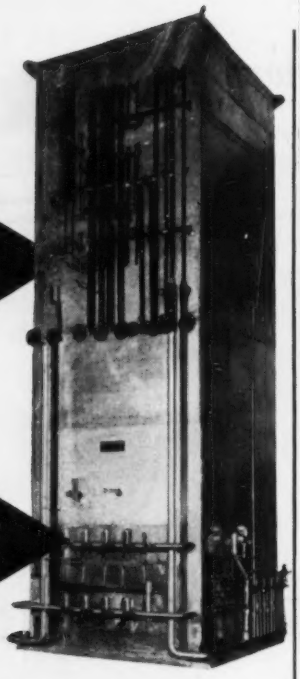

"We've never had such good Methane for our processes...

In fact, we did not think it possible to get Methane with so little C_2 in it," reports an official of a large American chemical plant now operating one of Air Liquide's low-temperature Methane units.

Methane purity of a very high order is a must when it is the starting point for the production of insecticides, grain fumigants, aerosol bomb propellents, and other chlorinated products.

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increase over the next few years.

Production in Russia has made great strides during the last decade. Official Russian reports indicate that production, estimated at 130,000 metric tons in '50, was doubled by '55, and increased 25% more during '57. Probable production level in '58 is 300,000-350,000 tons, Stubbs reports.

Price of electrometal zinc, (99.95%), which includes delivery to all parts of the U.S.S.R., is about 3,360 rubles/ton. At the tourist rate of exchange, 10 rubles to the dollar, this would be about $336/ton vs. about $250/ton in the U.S. Russia also claims to have the world's largest proved resources of zinc and lead. Although high-grade ores have been found, reports are that the material now being utilized is comparatively poorer.

Meanwhile, Soviet industry is importing about 100,000 tons/year (gross weight) of concentrates from North Korea, with smaller shipments being received from Bulgaria and Iran.

Under the new seven-year plan, zinc production is slated to increase about 60%. To accomplish this, two new plants will be built, and expansions are slated for some of the existing five plants. But an expected increase in Russian home needs is likely to raise consumption more than production, thus making Russia a large importer of zinc.

Polish Report: At present, the Soviets import a large amount of zinc metal, sheets and plates from Poland. Traditionally, Poland is a large exporter of zinc and zinc products, both to the Communist bloc countries and to the Western nations. Total exports have been fairly steady over the past three years — just under 100,000 tons/year. It is reported that Poland has restricted home consumption of zinc—estimated at 55,000 tons/year—to encourage exports as a way to obtain scarce foreign currency. Recently, Poland has been sending increasing quantities of zinc alloys and oxide to the West.

The Polish zinc industry regained its prewar production level about '50, and has shown a steady growth since. During '58, the production level was estimated at about 156,000 tons, from five producing plants, all in the neighborhood of Katowice. To achieve this production level, 150,000 tons (gross

weight) of concentrates were imported during '57, mainly from Bulgaria (77,000), North Korea (24,000) and Italy.

Czechoslovakia, with its heavy engineering and automobile industries, is another big outlet for zinc, consuming about 48,000 tons in '58. It is also a large importer of Polish zinc products (about 12,000 tons in '58), since the country has only two plants, both located near the Polish border. Total output is rated at about 20,000 tons/year.

Bulgaria, which has its own producing zinc mines, does not produce the metal. But recent reports are that a Russian-designed refinery will soon be built there.

Red Chinese Production: All Chinese production of zinc comes from ores mined in China. The country's output of metal, from a single plant in Manchuria, was estimated at about 14,000 tons in '58.

In '58, the Communist countries produced about 570,000 tons of zinc metal. Nearly all the ore that was used came from mines within the Communist bloc. Internal consumption, which increased an estimated 13% since '55, was close to 500,000 tons. Exports to the West totaled 70,000 tons.

Yugoslavia, which has had a close association with the Communist bloc, has steadily increased its production facilities for zinc metal. In '58, output amounted to about 32,000 tons, more than double that in '55. Major share, about 50%, is exported, primarily to Western and Middle Eastern countries. About 25,000 tons of zinc concentrates were shipped during '57 and '58. Recent declines in the metal content of ores mined in Yugoslavia stimulated concern among the industry. At present, additional mines are being opened and new equipment installed.

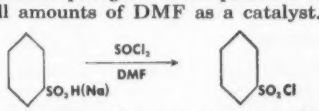
Exports Doubtful: Much concern has been shown over the rapid expansion of zinc production in Communist bloc countries (which has been much greater than that of non-Communist nations), since any large-scale dumping of materials in the world market could seriously affect industries in Western countries. Nevertheless, the enormous consumption potential of the Communist countries, Stubbs believes, will preclude the possibility of their becoming large net exporters of zinc.

Du Pont DMF

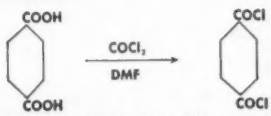
This excellent solvent has unusual catalytic effects in many chemical reactions

Dimethyl Formamide is gaining wide acceptance among research and development chemists as a reaction medium. In addition to its unusual solvent power, DMF has catalytic properties which may be of real benefit when used as a solvent medium. Here are a few examples:

PREPARATION OF ORGANIC ACID CHLORIDES[1-3]. Organic sulfonic acids or their salts can readily be converted to the corresponding acid chloride in excellent yields by treatment with thionyl chloride or phosgene in the presence of small amounts of DMF as a catalyst.



And for converting certain carboxylic acids such as terephthalic and trichloroacetic acid—



DEHYDROHALOGENATION. Many dehydrohalogenations are carried out smoothly using DMF as a catalyst and solvent. For example, DMF and lithium chloride gives good yields in the dehydrobromination of 2-bromo-trans-3,5-diketo-α-santanic acid[3]. Dehydrochlorination of 2-chloro-2-methylcyclohexenone to 2-methyl-2-cyclohexanone is easily carried out with DMF and LiCl[4]. Holysz[5] was one of the first to point out the mechanism of DMF in dehydrohalogenations.

ALKYLATION. The catalytic effect of DMF as a solvent for alkylations continues to be reported. For example, α-enol-γ-lactones are alkylated in DMF, whereas there is no reaction in ethanol[6].

There are many other types of reactions where DMF contributes as a catalyst, such as in the new synthesis of aliphatic nitro compounds using $NaNO_2$, the Ullmann reaction, Gabriel condensations, polymerizations and sulfonations.

Du Pont DMF is a highly polar solvent, capable of converting molecules into reactive forms by solvation, has a high dielectric effect and is a good solvent for organic and inorganic materials.

[1] Belgian Pat. No. 553,871; [2] Belgian Pat. No. 544,766; [3] Yanagita and Ogura, J. Org. Chem. *23*, 443 (1958); [4] Warnhoff, Martin and Johnson, Org. Syn. *37*, 8 (1957); [5] Holysz, J. Am. Chem. Soc. *75*, 4432 (1953); [6] Stacy, Cleary and Gortatowski, J. Org. Chem. *22*, 765 (1957).

SEND COUPON for new technical bulletin reviewing the catalytic and synthetic applications of DMF. Also available, General Information Bulletin on DMF describing other uses, physical properties, handling information.

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Technology Newsletter

CHEMICAL WEEK
May 9, 1959

Metalloceramic polymers made by irradiation may be possible, a recent Australian patent application (41,236/58) of Union Carbide Corp. indicates. The process involves irradiating a mixture of one or more metal or metalloid oxides, silicic acid and an organic hydroxy compound with 100-400 million roentgens/gram until a solution is formed. This is followed by polymerization of the solution at elevated temperature. Carbide offers no further details, says the process is still in a very early stage of investigation.

•

The world's first boiling heavy-water reactor (HBWR) will soon be put in operation at Halden, Norway. The 20,000-kw. (heat) unit was built by Norway's Institutt for Atomenergi (near Oslo) in cooperation with Norwegian industrial groups, will be used mainly to produce process steam for a nearby paper mill. Two engineers from Argonne National Laboratory's reactor engineering division will assist with startup and performance tests at Halden.

•

Reclamation of nylon from used auto tires is the objective of a new process U.S. Rubber Reclaiming Co., Inc. (Buffalo, N.Y.) plans to install. The process, worked out with Arthur D. Little, is said to yield good-quality nylon, which has a slight tint. The company currently reclaims rubber using a patented process.

•

Dipping capital costs for saline-water conversion plants are evident in the contract awarded by the Sheikdom of Kuwait last week to G. & J. Weir, Ltd. (Glasgow, Scotland). The winning bid, for a 2.25-million-gal/day flash distillation plant, was $1.7 million. Other distillation capital cost estimates have been over $1/daily gal., and often in the vicinity of $1.50.

•

Chemicals from grain via fermentation were suggested at this week's meeting of the American Society of Cereal Chemists as a partial solution to the problem of huge U.S. agricultural surpluses. Biochemist Fred Tanner, of Chas. Pfizer & Co., pointed out that, in addition to producing such important chemicals as acetic, lactic, oxalic, gluconic, citric, fumaric, itaconic, kojic and gibberellic acids, fermentation has recently been proved practicable for the production of certain amino acids. However, cautioned Tanner, fermentation requirements for cereal starting materials aren't likely to make much of a dent in surpluses in the near future. Reasons: demands for cereal-derived products are still too small to justify large-scale production; competitive starting materials (e.g., molasses) for large-volume fermentation products cost only one-quarter as much.

•

Japan's first uranium processing plant has run into trouble from excess impurities in its initial batch of uranium metal. Engineers at Atomic Fuel Corp.'s recently completed Tokyo refinery (*CW Technology*

Newsletter, April 11) have been unable to account for relatively large quantities of nickel, aluminum and iron in the batch, but they believe impurities may have been present in the equipment or introduced by impure process water.

•

A new drug for Parkinson's disease was reported this week by Drs. Lewis Doshay and Kate Constable, of Columbia University (New York). It's chlorphenoxamine hydrochloride (a derivative of diphenylhydramine hydrochloride), is antihistaminic and antispasmodic. It reportedly is useful for relief of muscular rigidity, loss of motor function, fatigue, depression and weakness—less effective against tremor.

•

A new approach to the control of diabetes, breast cancer, and other disorders may result from growth-hormones research described at this week's meeting of the American Society for Clinical Investigation, in Atlantic City. Sloan-Kettering Institute (New York) researchers Martin Sonenberg and William Money report that acetylation modifies cattle pituitary growth hormone so that it blocks overproduction of normal growth hormone injected into animals. This overproduction is associated with various diseases. Other chemical modifications (nearly 80 have been tried) did not produce this effect. Attempts to produce human growth hormone for subsequent acetylation and tests are now under way.

•

Dow Corning and Monsanto have licensed an ultrapure-silicon process from Westinghouse. A refinement of the German Siemens process used by Merck at its more-than-25,000-lbs./year plant (*CW, Sept. 6, '58, P. 76*), the Siemens-Westinghouse version is thus newly available for commercial production.

Dow Corning has been making silicon as a raw material for years, but this is its first step toward diversifying from silicones and producing the purified elemental material. Monsanto, said to have been studying silicon for some time, has now made its first move. Neither firm announced plans for production facilities.

The highly purified silicon contains less than one part per 6 billion impurities, equivalent to a resistivity of about 1,000 ohm-cm. Others interested in silicon of this purity include Du Pont, which licensed a process from International Telephone & Telegraph last year, and International Metalloids (W. R. Grace and Pechiney), which is researching its own process.

•

Dewey and Almy started up a paper research laboratory last week. The lab located at D&A's Cambridge, Mass., headquarters is staffed by three papermaking experts. Polymeric impregnation and coating, as well as basic papermaking, will be studied.

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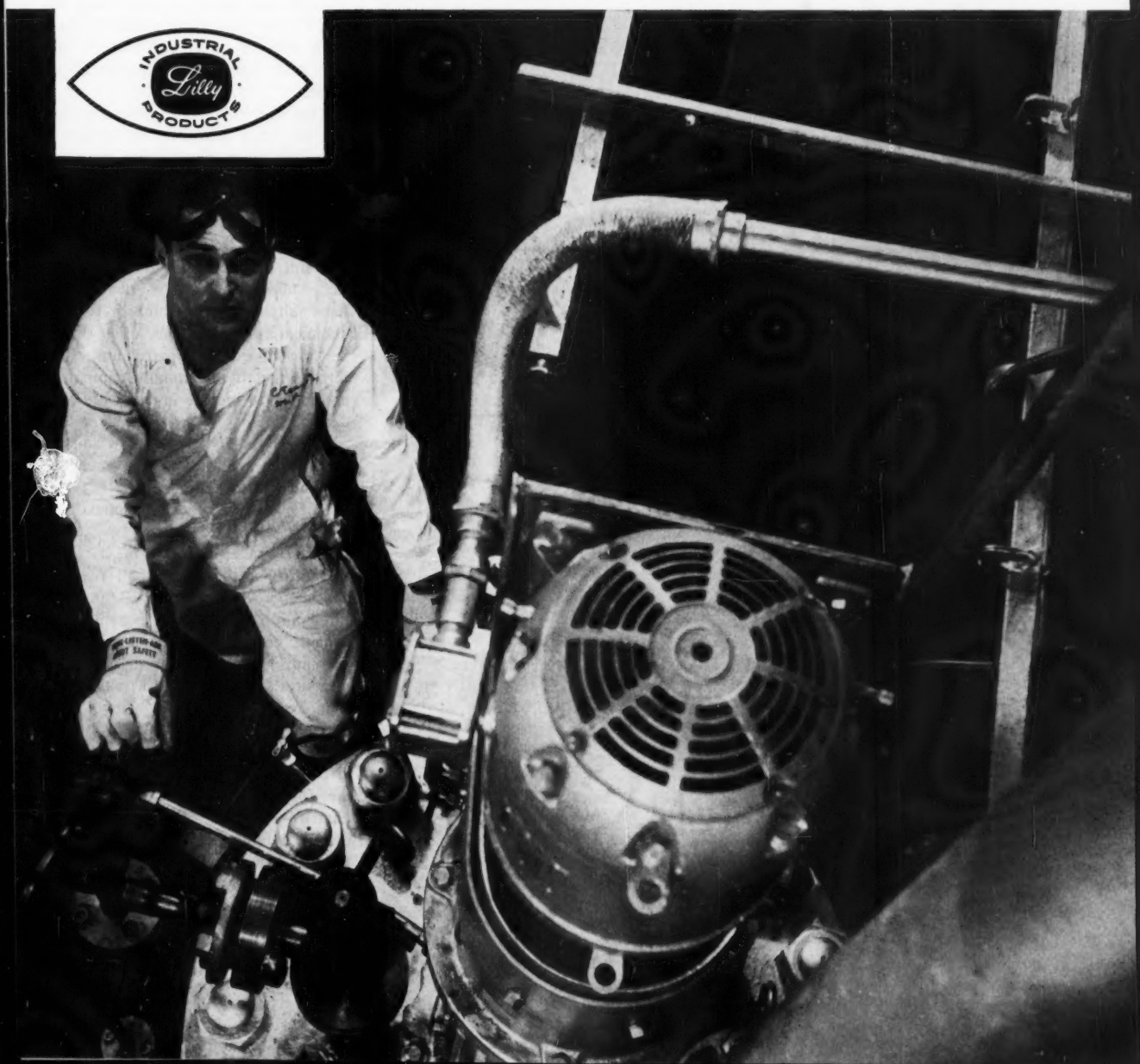
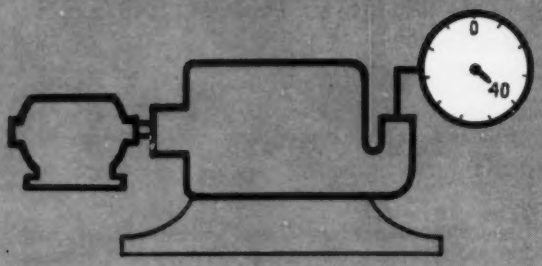
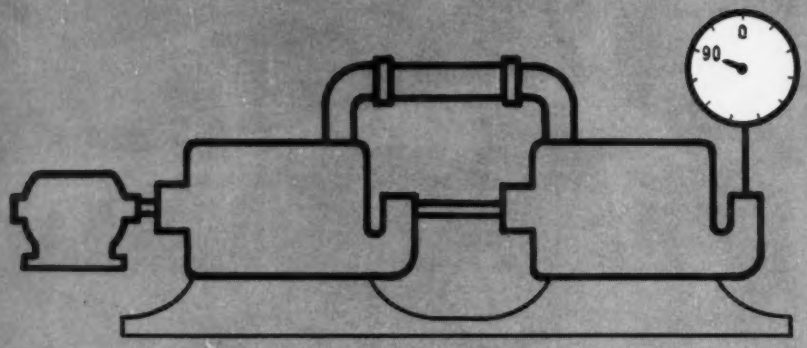


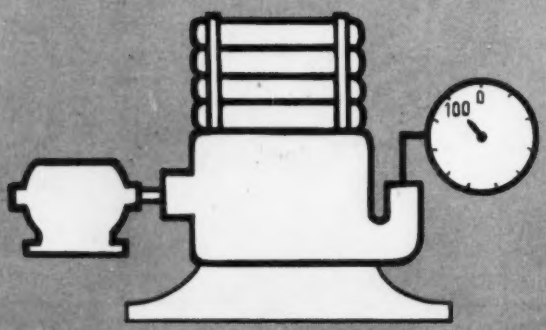
Cool Route to Compressor Savings



OLD Centrifugal compressor without cooling; air compressed only to **40 psi.**



PRESENT Compressors in tandem with cooler in between; air is compressed to **80-100 psi.**



NEW Compressor with cooling for each stage uses less power, less space; air is compressed to **100 psi.**

The chemical industry is taking a new look at the centrifugal compressor, and the chart on the left shows why. New designs that drop horsepower requirements—and operating costs—closer to those of reciprocating compressors are the boast of several manufacturers of units for supplying 100-psi. air.

The new designs, which use multistage cooling, approximate those introduced in Europe several years ago. But the first U.S.-made unit for industrial use wasn't shipped until the end of last year. Only a handful have been shipped since, and there is still no real operating experience on these.

The steel industry's present scramble for large quantities of oxygen is the most-given reason for introduction of the new compressors. Previously, there was no incentive to invest large sums of money in design development, say compressor makers. But the steel industry is not the only taker. Two new centrifugals have already been shipped to one chemical company. And, other chemical firms, utilities, petroleum, nonferrous metals and mining companies are slated to receive units of the new design.

More Capacity: Centrifugal and reciprocating compressors have capacity and pressure limitations that suit each for specific types of applications. Centrifugals have higher capacities (average range: about 6,000 to 100,000 cfm. at the inlet) than reciprocating compressors (about 10,000-cfm. maximum). But even specially designed* centrifugals have lower compression ratios, develop much lower pressures (about 5,000-psi. maximum) than reciprocating units (about 35,000 psi.).

The steel industry's trend to higher-capacity, lower-pressure (100 psi.) air for oxygen plants has favored centrifugals. But, within the area in which both reciprocating and centrifugal compressors can operate, efficiencies favor reciprocating compressors.

In discussing power requirements

*High-pressure centrifugals have double cases. A barrel-like outer case surrounds the regular inner case.

for 100-psi. units, compressor makers usually figure that reciprocating compressors require about 19 hp./100-cfm. capacity. Centrifugals take about 25-28 hp., depending on the maker.

John Parris, Cooper-Bessemer's manager of centrifugal compressor sales, explains the new designs this way: "They're all shooting for the horsepower of the 'recips.' I won't say that ours will get us down quite to 20 hp./100 cfm., but we won't be too far away. This could be about 88% of previous designs."

Ingersoll-Rand's Bill O'Leary pegs its new machines at 20½-21½ hp./-100 cfm. And De Laval Steam Turbine's chief engineer, Fred Koenig, talks of a 10-12% horsepower reduction. Although operating costs vary considerably between plants and sections of the country, it is not uncommon for companies to talk of saving $100-200/year for each unit decrease in horsepower. Even at a much lower savings, a 10% horsepower reduction on a several thousand-horsepower unit would give healthy over-all savings.

Cool Route: Key to reducing horsepower is in cooling the compressed gas. A centrifugal can't compress air much beyond 40 psi. in about five stages without cooling for the cast-iron casing. Special materials of construction permit higher pressures (about 75 psi.) but cut efficiency —the hotter the air becomes during compression, the greater the horsepower required for further compression.

Running two compressors in tandem, with a cooler for the air between the compressors (*see diagram*), boosts pressure. But cost goes up and horsepower requirements aren't reduced. Many installations are operated on this system. Yet, compressor makers have made several well-accepted design improvements between tandem operation and the newest multistage-cooled units.

In one design, water is sprayed into the gas stream for cooling; in another—the interstage-diaphragm type —the cooling-jacket principle is used to increase pressures to about 100 psi. in a single compressor body.

The use of a single body cuts space requirements; smaller space requirement is one of the main advantages of a centrifugal over a reciprocating compressor. A reciprocating unit may require as much as three or four times the plant area of a centrifugal. And a centrifugal may weigh only 15-20% as much as a reciprocating machine, require only about twice its weight in foundation, compared with a reciprocator that requires about five times its weight in foundation material.

Single re-entry cooling (the gas is removed, cooled and returned to the same compressor body) simplifies compressor body design and reduces cost but doesn't bring horsepower down much.

The latest multistage-cooled designs cool the gas after each stage of compression. I-R says the cost of these units is about the same as that of previous models—the expense of increased cooling is offset by savings resulting from fewer compression stages. But other manufacturers talk of slightly higher costs, cite lower horsepower requirements as the economy factor.

Who's First? While competition is keen, compressor makers don't dispute that I-R was out first with multistage units for industrial applications. I-R began selling these models about 1½-2 years ago, made the first shipments about the turn of the year and has about 20 units on order.

But Cooper-Bessemer reports that it developed a multistage-cooled design in '55 for a government-classified operation. C-B didn't push commercial development until after I-R made its move, but has now shipped several units, has more on order. Clark Bros. also has sold units.

Among the other makers, positions vary from De Laval, with a basic design ready for sale, to Worthington, which has done experimental work but isn't yet ready to commit itself commercially.

It's hard to evaluate the relative importance of these positions. The compressor manufacturers all point out that even I-R is considerably behind Brown Boveri, which has been selling its "isotherm" compressor, developed in Switzerland, for several years. A number of these units are used in this country, mainly for supplying 120-psi. air for nitric-acid plants of Chemical and Industrial Corp. design.

Theoretically, the Brown Boveri units should have slight efficiency advantages. Compression is carried out in nine stages, with seven cooling stages—several more than most U.S. designs have. But, as one U.S. company points out, it would be difficult to increase the number of stages in its design without upping selling price considerably.

More than Cooling: Each U.S. maker points to advantages of its own design. "While the biggest drop in horsepower comes from cooling at each stage with as little pressure drop as possible, other improvements in basic design can help make further cuts," says C-B's Parris. For example, Parris points to the improvements in blade design made by C-B.

De Laval's Koenig divides design improvements into three categories: metallurgical, aerodynamic, mechanical. Heat problems, for example, can be overcome metallurgically. "Aerodynamic improvements are strictly a matter of improving the machine's proportions. At one time, we couldn't design centrifugals with outlet ratings below 400-500 cfm. It's still in the talking stage, but we're optimistic about outlet velocities in the 100-cfm. neighborhood," says Koenig.

"And, engineers will have to live with higher speeds," he adds. With improved wheel proportions, blade and disc designs, and with metallurgical improvements that permit better high-carbon-steel welding and the use of forgings, speeds of 20,000 rpm. are no longer uncommon.

Improved rotor designs (e.g., use of flexible rather than stiff shafts) are also increasing speeds. "The perfect rotor has no critical speed because it is in perfect balance. We've also improved balancing techniques over the past few years," says Koenig.

Maintenance Posers: As long as centrifugal and reciprocating compressors continue to overlap in some applications—e.g., oxygen plants—there will be arguments about maintenance costs. Boosters of centrifugals point out that centrifugals can run for about two years without shutdown, need only periodic oil changes during the running period. Reciprocating compressors must be shut down every two months for servicing (e.g., replacement of the packing that seals the piston rod in the cylinder).

One compressor expert sums it up this way: with reciprocating compressors, problems are likely to be frequent but small: with centrifugals,

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problems are usually less frequent, but they can be large. The latter will often require removing the heavy casing, opening the entire unit.

Minor maintenance problems are a part of any compressor installation. But makers of the new, 100-psi. multistage-cooled centrifugals will likely find that some potential customers will sit tight until operating experience shakes out major problems. And purchases will be limited mainly to air applications. In fact, I-R doesn't recommend its new units for oxygen, says special designs and special seals would be required.

C-B doesn't make this distinction but points out that some companies won't take a chance with oxygen; they feel it's too touchy without special designs. De Laval cites broader potential applications, speaks of air, diatomic gases (e.g., oxygen) and gases where polymerization by excessive heat might be a problem.

Others point out, however, that cooling will be the major restriction on use of the new compressors. Many chemical-industry compressor applications require specially designed coolers for different types of gases. And compressor makers generally agree that changes in cooling usually call for compressor-design changes. But even if new multistage-cooled centrifugal compressors find their applications limited to air service, their future would not be dark. Chemical plants without an air compressor aren't easy to find.

Finds Accident Makers

Industry has long been concerned about the employees whose names repeatedly show up on accident reports—the accident makers. And, last week, Joseph Dean Edwards, president of Executive Assets, Inc., New York business consultant firm, reported that his company has developed a test to find the accident makers—before they get on reports.

The test, a 20-minute, 150-part multiple-choice questionnaire, is claimed to grade employees on their fitness for exposure to various conditions of hazard. It is designed to fit readily into job-screening procedures already used by companies, can guide in job placement and in judging the amount of safety training needed by each employee, says Edwards.

Executive Assets based the test on specialized research begun in the '40s by New York University's Thomas Jenkins. It went further, enlisted the aid of 68 U.S. and Canadian companies in 36 industries, including the chemical industry. Company safety and medical departments chose 465 pairs of proved "safe" and "nonsafe" workers, matched by job classification. These provide the base on which subjects are now judged.

Make them Safer: Identification of the individuals who can best accept training in safety habits will help industry effect substantial savings in operating costs, says Edwards. He says injury repeaters are: "less prudent, more easily distracted, disinclined to accept rules, less affected by the feelings or actions of others, differently affected by the idea or memory of pain, presumptuously self-assured and aggressive and self-assertive toward others."

Dr. Gerald Gordon, psychiatrist in Du Pont's Medical Division, points out there is a small group of workers who can't be protected by equipment or training. "Obviously there is something more than hard luck plaguing a man whose career shows a long series of injuries," he says.

The accident maker is suffering from a form of mental illness. He's a troubled person who unconsciously hurts himself, says Gordon.

Psychiatric treatment isn't always possible, sometimes not desirable. But Gordon offers another approach that has proved highly effective for Du Pont: employees are required to follow safety rules, develop sound work habits. Supervisors are given direct responsibility for the safety of their men, are rated "unsatisfactory" when they tolerate unsafe acts.

Another segment of the CPI, the oil industry, also finds that charging supervisors with a group's safety is helpful. Tidewater Oil's president, George F. Getty II, says that in '53 Tidewater's injury frequency rate was almost three times that of the industry, despite safety meetings, protective equipment, training, posters, literature, inspections, prizes and safety engineers on the payroll. But, since turning job-safety responsibility over to the line personnel, making safety engineering a staff advisory function, Tidewater has set improvement records, now has a frequency rate below industry average.

EQUIPMENT

Wireless Heating Tape: A flexible heating tape, made without wires, is now being marketed by Sunelec Inc. (P.O. Box 1139, Trenton, N.J.). The tape is made of woven glass fibers impregnated with conductive silicone rubber; it withstands temperatures up to 400 F continuously and up to 600 F intermittently. Suggested applications: piping heaters, tank or hose liners, low-temperature ovens and curing tunnels. Sizes available range from ½- to 6-in. widths, 5- to 12-mil thicknesses.

•

Impact Mill: Entoleter Division of Safety Industries, Inc. (New Haven, Conn.), has designed a new model of its Series 27 CentriMil impact mill (*CW, May 17, '58, p. 67*) for plants operating with pressure systems or processing explosive material. The new model meets ASME code 1956 for unfired pressure vessels, will retain an explosive force of 100 psi.

•

Plastic Fittings: Amercoat Corp. (South Gate, Calif.) has added a variety of fittings to its line of Bondstrand (epoxy and glass fiber-reinforced) plastic pipe. Pipe and fittings are suitable for transporting corrosive solutions or for use in areas with corrosive fumes or a moist atmosphere.

•

Manual Valves: Two companies are offering new manual valves. Conoflow Corp. (2100 Arch St., Philadelphia 3) has a new line, called Series LM, with extra-thick body walls cast to 600-lb. ASA rating. It is available in ductile iron, steel, bronze and many high alloys. Sizes range from ¾ to 6 in.

Anderson Brass Co. (102 South Campbell Ave., Detroit) has a new line of screw-stem shutoff valves, the 30V-50V Series, designed to prevent leakage and clogging by viscous liquids. Standard models handle pressures to 500 psi., temperatures from —40 to 250 F, while special units can be designed for more extreme conditions (e.g., pressures up to 3,000 psi.). Sizes are ⅛-in. and ¼-in. IPT.

•

Switches: Micro Switch Division of Minneapolis-Honeywell Regulator Co. (Freeport, Ill.) has a new enclosed switch that is watertight and explo-

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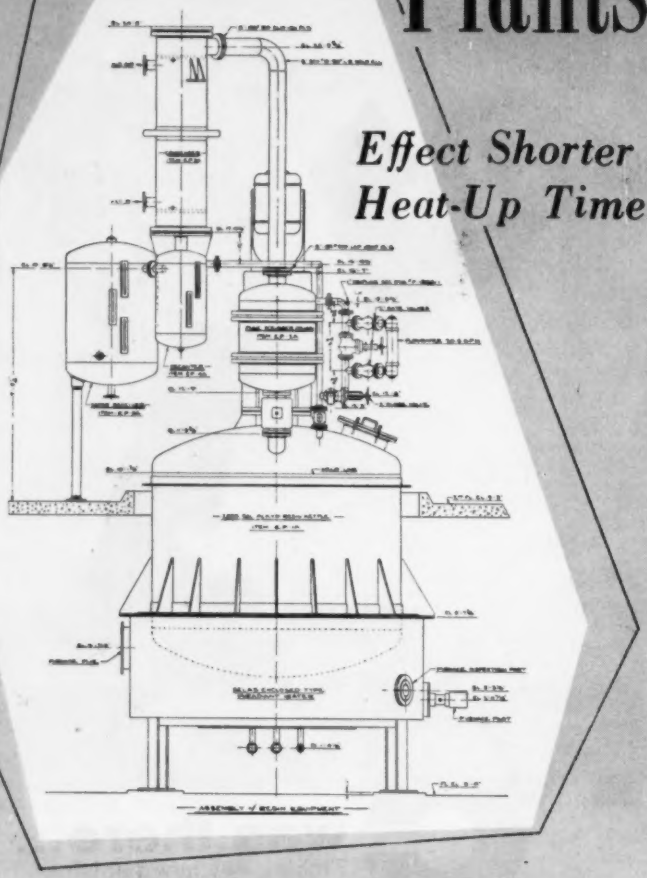

This assembly drawing shows the principal processing equipment of just one type of resin plant engineered, designed and constructed by I★P★E. Short heat-up time is guaranteed for specific formulations. Accurate temperature control is assured.

For further details on resin plants, or on any chemical unit you may be considering, contact I★P★E's Process Plants Division, Dept. L.

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PRODUCTION

sionproof for use on fuel-handling equipment, industrial valve-control systems and other outdoor installations. The new switch, called 2CX3, is rated at 20 amps., 125, 250 or 460-volt ac.

And Metals & Controls Division of Texas Instruments, Inc. (Attleboro, Mass.) is now offering a precision switch useful in environments with temperatures up to 800 F. The new switch, Klixon 21135-1, is rated at 5 amps., 30-v. dc., is about one-third the size of comparable units.

•

Plastic Insulation: Plastic is used as insulation in three new devices. Borden Chemical Co., Resinite Dept. (Santa Barbara, Calif.), is now offering a new fungus-resistant vinyl wire sleeving that is transparent. It's called Resinite EP-69C, allows identification of color-coded wiring inside.

Du Pont's new Teflon FEP is being used as wire insulation by Tensolite Insulated Wire Co. (Tarrytown, N.Y.). Preliminary test results indicate that this resin has greater resistance to radiation than Teflon TFE. It is also said to allow the use of tinned copper rather than silver-plated copper for high-temperature wire and cable.

And Teflon is also used in a new line of feed-through insulators now offered by Fluorocarbon Products Inc., division of United States Gasket Co. (Camden 1, N.J.). Both permanent and semipermanent, or demountable, seals are available, designated Chemelac Series CF-400 and CF-414, respectively.

•

Controllers: Several new controllers have recently come on the market. For instance, Thermo Electric Co. (Saddle Brook, N.J.) has developed a new Signaling Controller that is suitable for two-position control of industrial operations. It can be used with any transducer generating a direct-current signal, reacts to changes as small as 1 microvolt, and indicates with an accuracy of ±0.25% of full scale. Red and green panel lights indicate process conditions, and automatic shutoff is provided in the event of failure of any system component.

A controller for pressures or temperatures in small plants is being offered by Fulton Sylphon Division of Robertshaw - Fulton Controls Co. (Knoxville 1, Tenn.). It's called the

Fulto-Lectric controller-positioner-valve combination, operates by positive valve positioning in response to a signal generated by changes in the measured variable.

United Electric Controls Co. (Watertown, Mass.) has added Models 670 and 680 to its line of J51 pressure controls. The new models increase the adjustable range of the control from 350 to 1,700 psi. Range of Model 670 is 50-1,000 psi., of Model 680, 100-1,700 psi.

A hand-loader pressure regulator for use with air, nitrogen or helium is offered by Clary Dynamics Division of Clary Corp. (San Gabriel, Calif.). Maximum operating pressure is 4,000 psig. upstream and 3,000 psig. downstream; the loader is adjustable in the full range from 0-3,000 psig.

Clark Bros. Co., division of Dresser Industries (Olean, N.Y.), now has a new line of packaged control systems, designed for a wide range of compressor automation. Model SE provides off-on control at the compressor location; Model SEC, also located at the compressor, is designed to monitor and automatically control all operating phases from start to stop; and Model SEC-R provides the same kind of control from a remote location.

•

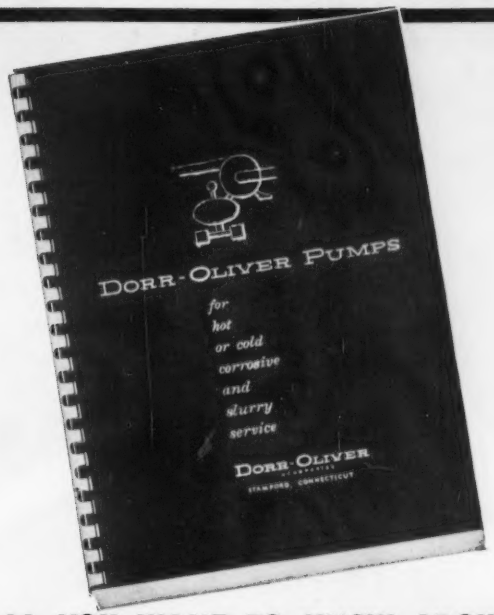
Gas Chromatography Sampler: Fisher Scientific Co. (717 Forbes St., Pittsburgh 19) has developed a glass sampling tube for use in gas chromatography. The new Side-Draw tube has a self-sealing rubber cap that allows the introduction of a hypodermic needle for the withdrawal of accurately measured samples.

•

Filter Assembly: Chem Flow Corp. (Lodi, N.J.) has filter assemblies made of Pyrex and Teflon, which feature high chemical resistance and low pressure drop. The assemblies are designed for use at pressures up to 50 psi. and temperatures to 450 F. They are available in either angle or "Y" types, completely assembled and ready for operation.

•

Filter Scraper: A new scraper that conforms to the changing contours of a disc filter has been developed by Peterson Filters and Engineering Co. (Salt Lake City) to increase the capacity of disc filters by raising the efficiency of cake discharge.



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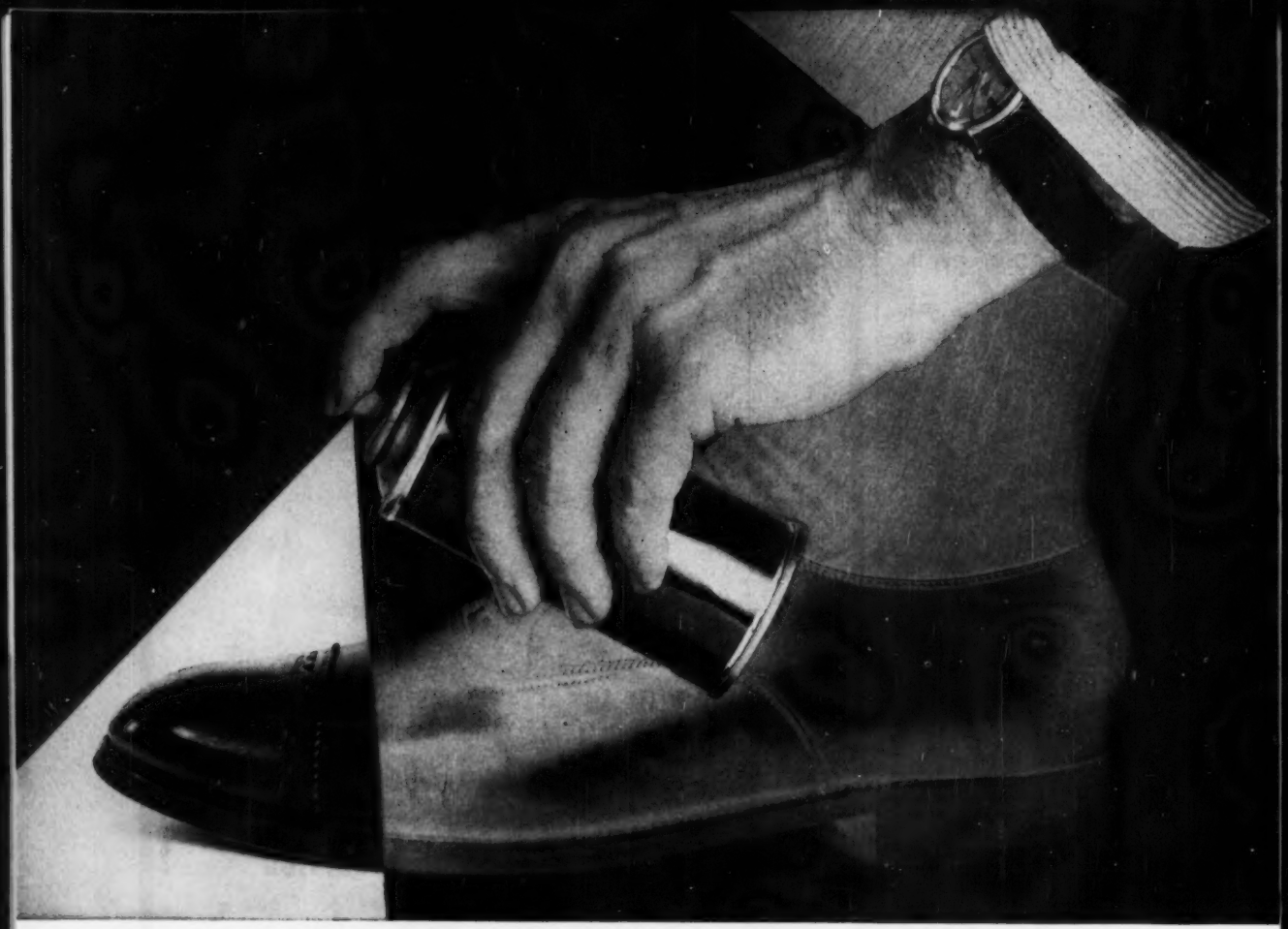

Newest packaging idea in a $60,000,000 market

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In a recent Du Pont survey, housewives who tried aerosol shoe polish preferred it 6 to 1 over any other form. The secret: aerosols deliver shoe polish in a completely new form—a form that's faster and easier to apply than shoe polish in conventional packages.

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Market Newsletter

CHEMICAL WEEK
May 9, 1959

A sizable resin market is slipping out of the hands of several major suppliers. Robert Morrison, head of five reinforced-plastics molding companies (which turn out Chevrolet's Corvette body, truck cabs, boats), has followed through on his oft-repeated—and as often discounted—warning that he will make his own resins.

Morrison last week confirmed reports that he has started construction of a resin-producing plant near the largest of his companies, the Molded Fiber Glass Body Co. at Ashtabula, O. Initial capacity will be 6 million lbs./year, expandable to 12 million lbs./year. The plant is scheduled for completion Sept. 1.

Although Morrison's unit will blend several types of resin materials, there's particular interest in his use of isophthalic resins. He recently said (*CW, April 18, p. 121*) that he used about 4 million lbs. of isophthalic polyester resins in '58, might use as much as 9 million in '60. The new resin plant, he now adds, will probably use about 1 million lbs./-year of raw material isophthalic acid.

Resin makers who heretofore have supplied Morrison's needs have privately expressed doubts about the wisdom of his action. They think it would be wiser if Morrison were to play it safe, stick to molding, leave resin production to those experienced in chemical manufacture.

But there may be more at stake than the loss of Morrison's business. There's the danger that Morrison—already known as an unorthodox industrial entrepreneur—could prove that resin production by molders is profitable, convince other molders to try chemical manufacture, too.

•

Despite some trouble spots, sales of plastic materials "will probably quadruple in the next decade," says Maurice Crass Jr., secretary of the Manufacturing Chemists' Assn. Speaking to New York security analysts (at a recent lecture course sponsored by Allied Chemical at the New York Chamber of Commerce), Crass pointed to exceptional plastic growth expected in structural uses. Structural plastics, he said, could achieve an annual sales of $2 billion by '66, which is "equivalent to the entire plastic industry's total sales last year and an indication of how close we are to the plastic age in architecture."

•

A stiff battle for chlorine and caustic soda markets is shaping up in Canada's Maritime Provinces. At stake is a market for 20,000 tons/year of chlorine and 12,000 tons/year of caustic—now largely supplied by Quebec-based plants of Canadian Industries Ltd., and to some extent by Aluminum Co. of Canada.

Plans to build a chlorine-caustic plant at St. John, New Brunswick, by Canadian industrialist K. C. Irving (who has interests ranging

from sawmills to a new oil refinery) catalyzed quick action by CIL, whose experts are reportedly studying feasibility of producing these chemicals in the Maritimes.

•

Monsanto's new sodium tripolyphosphate plant at Long Beach, Calif., is now onstream. Need for the installation—to supply fast-growing needs of manufacturers of soaps, synthetic detergents, water softeners, drilling muds, etc.—was anticipated in '55, when Monsanto's inorganic chemicals division put up a phosphoric acid plant at the site. Capacity hasn't been divulged.

•

Early posting of higher prices for borax and boric acid by Pacific Coast Borax last week helped kick off an expected round of midyear price adjustments in the CPI. The increases—slated for Juy 1, and attributed to higher production costs—move boric acid listings to these levels (price/ton, carlots): crystalline and granular acids, each up $3.50/ton, are now $163.50 and $112/ton, respectively. No changes were posted for anhydrous material, which remains at $335/ton.

Carlot prices for borax moved up to these new postings: anhydrous, up $4.50, to $87.50/ton; granular decahydrate, up $2.50, to $50/ton; pentahydrate, up $1.50, to $64.50/ton.

Latest report is that other producers were studying the PCB increases, unofficially agreed that the new prices will soon probably be industry-wide.

•

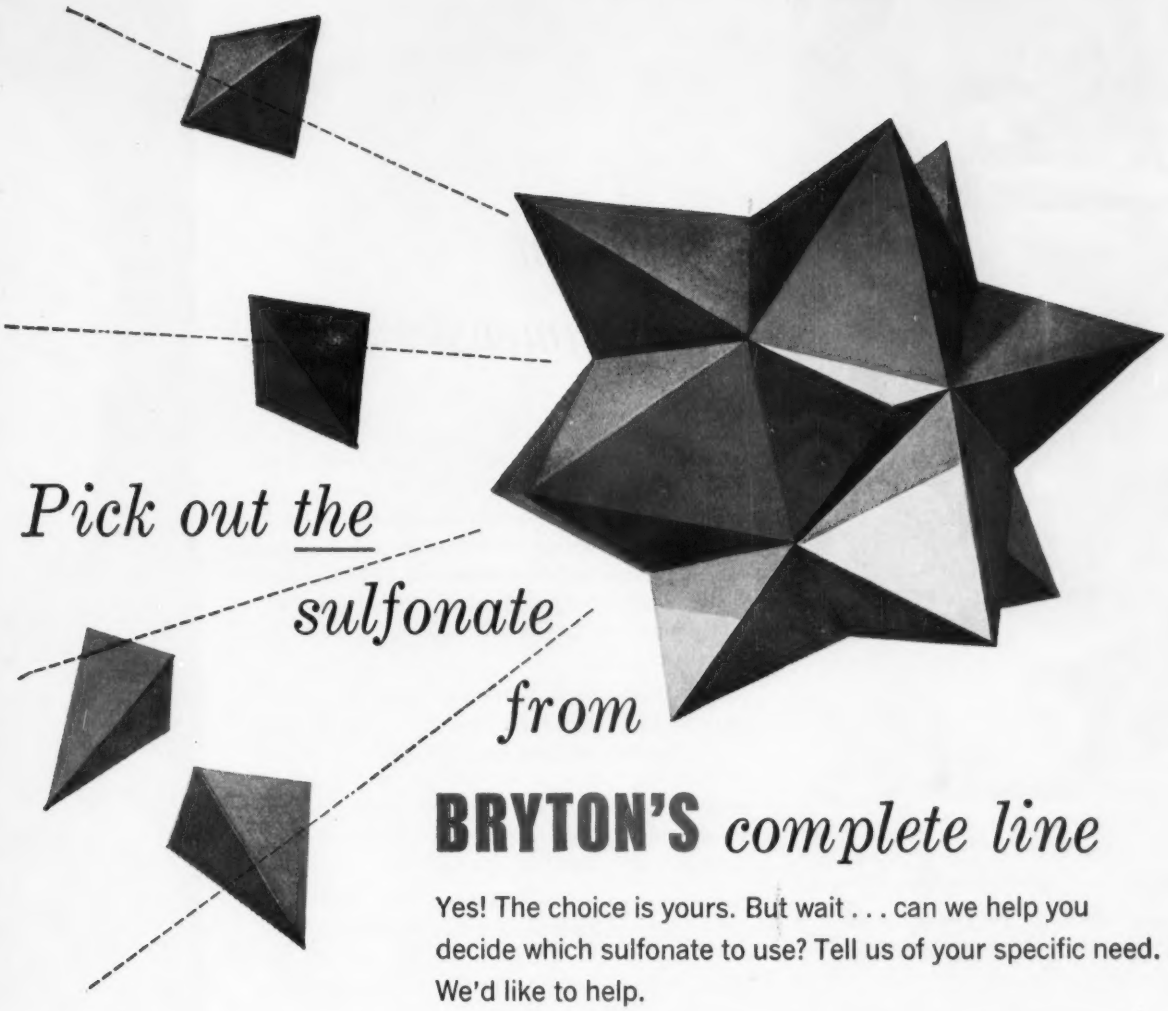
A 10¢/lb. butyl acrylate price cut was posted last week by Celanese and by Union Carbide: tank cars, 45¢/lb; carload and truckload drums, 47½¢/lb. Prices west of the Rockies are 1¢/lb. higher.

The new developmental prices will, the industry hopes, spur greater use of the chemical in production of paint, textile and leather finishes, other industrial products.

SELECTED PRICE CHANGES — WEEK ENDING MAY 4, 1959

	Change	New Price
UP		
Beeswax, crude, African, bags	$0.02	$0.55
Coconut oil, crude, tanks	0.0025	0.2125
Mercury metal, 76 lbs. per flask	3.00	245.00
DOWN		
N-Butyl acrylate, tanks	$0.10	$0.45
Methyl naphthyl ketone, cryst., cns.	0.55	2.45

All prices per pound unless quantity is quoted.



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	Bryton BOSS® 470	460	70
Barium Sulfonates	Bryton Hybase® Barium Sulfonate 65 Base No.	1010	47
	Bryton Barium Sulfonate 30-N 2 Base No.	1010	30
Calcium Sulfonates	Bryton Calcium Sulfonate 30-A	900	30
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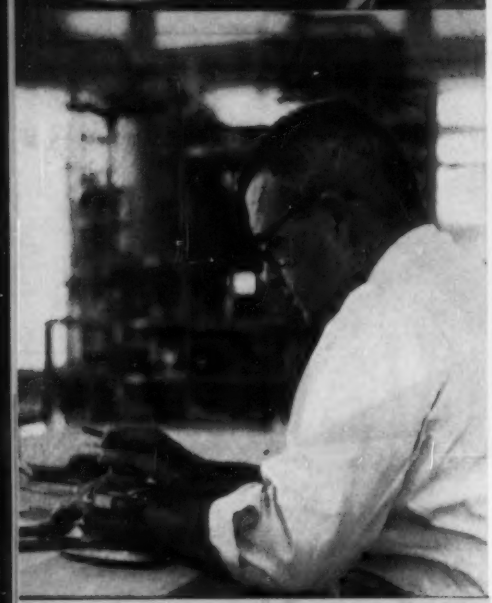

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FLUOR

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Design in three dimensions

At Fluor's Los Angeles headquarters, there is an 8,000-square-foot building where 30 plant designers work with 20 professional modelmakers. Drafting tables are within 10 feet of model assembly tables. Another building contains an elaborate photographic studio where precisely scaled isometric and plan views can be taken under shadowless lighting.

All this began seven years ago when Fluor engineers built a scale model and rigged miniature hoists to solve a difficult erection problem. Success of this trial led to experiments with the use of models as a basic design tool. Cost studies showed substantial savings in drafting man-hours (net savings, above modelmaking costs.)

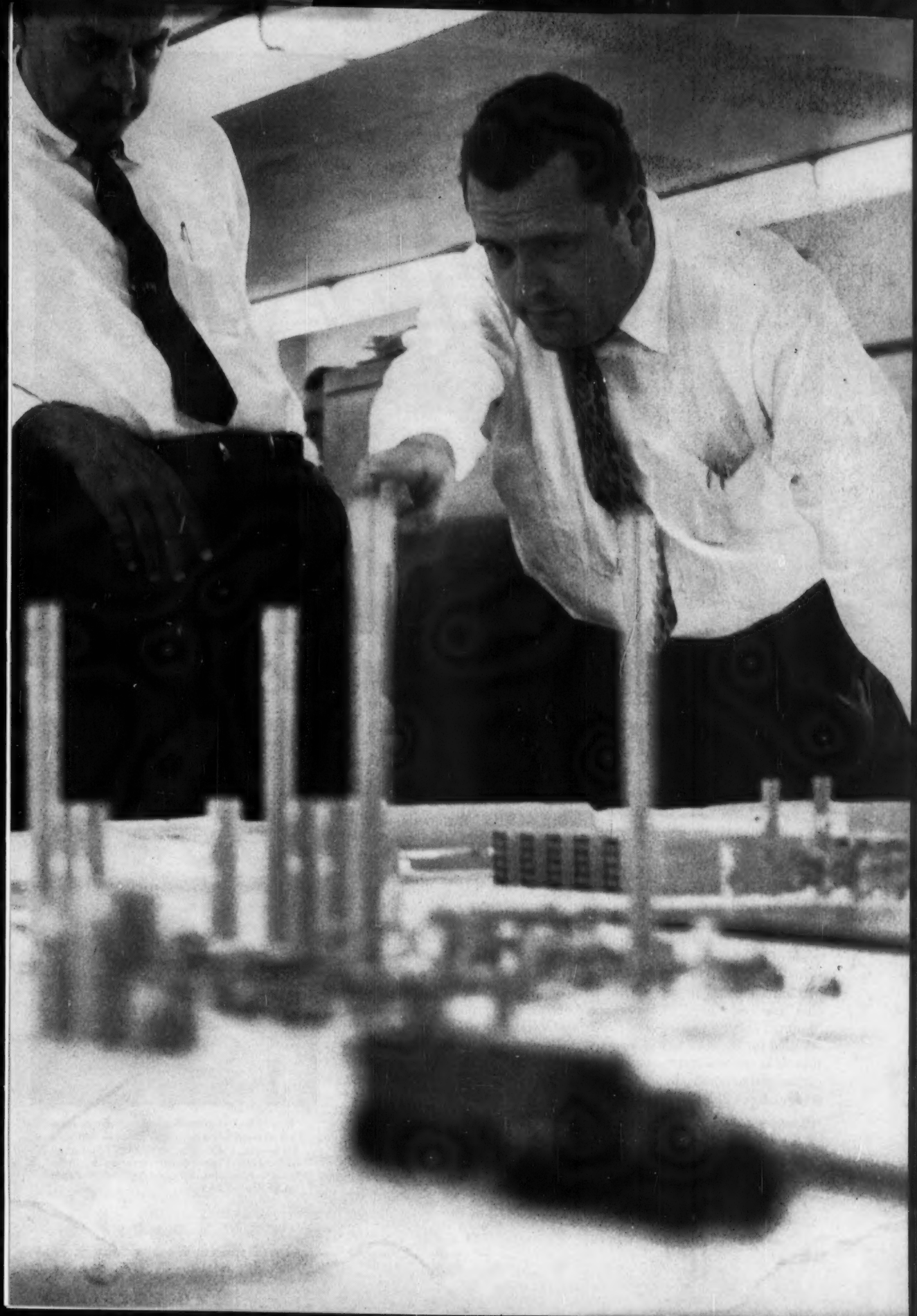
Today, models are to be found in most of Fluor's drafting rooms, and nearly all Fluor-built plants are designed with the aid of this tool. Beyond the dollar savings there are many less tangible benefits. Sizable groups can confer over a model, reach quick agreement on layouts, approve or revise many details at a single session.

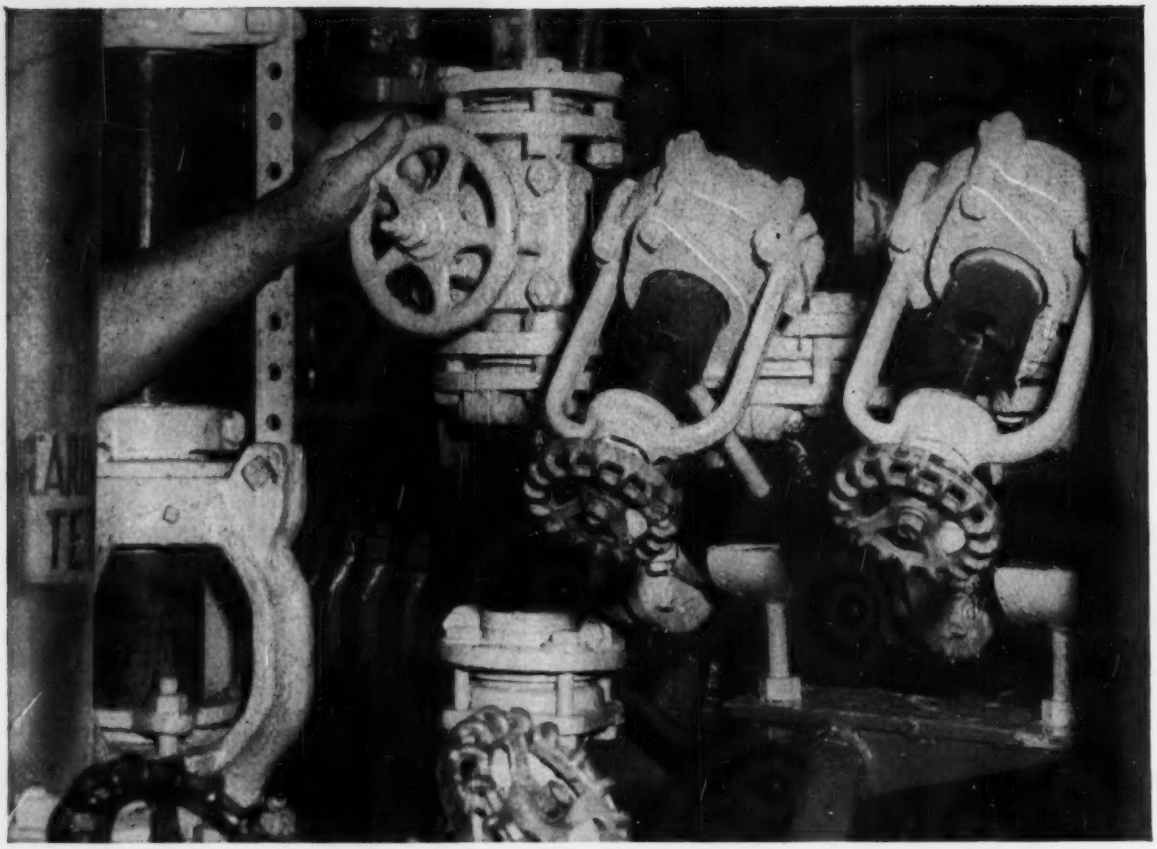
Piping runs are shorter and more direct, valves and instruments are more accessible when designers lay them out on a model (a Fluor comparison study of a refinery design showed a $50,000 saving in pipe, fittings and fabrication by use of a model vs. conventional layout drawings.)

Costly revisions are minimized when many specialists can study a complete plant in miniature before construction begins. In the field, models serve as a reference for construction crews and a guide for operator training.

Unless scale models are properly used—as a basic, integrated design tool—most of these advantages are lost. The development and refinement by Fluor of design techniques using scale models has been a creative contribution to the engineering and construction industry.

For more information on the use of scale models in design and construction, write to Dept. 17, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.





THE INSIDE STORY OF 40 MONTHS RESISTANCE TO CORROSIVE ACIDS

Here's still another "proved-in-action" case history of Penton*—the new thermoplastic polymer with exceptional resistance to corrosion at elevated temperatures.

THE CHALLENGE: The highly corrosive chemical processing installation pictured above. In the heart of this complex of valves and piping made of Haveg, glassed steel, porcelain and Pyrex, is this Hills-McCanna diaphragm valve with a cast iron body *lined with Penton.* Mounted above a glassed steel vessel used for hydrocarbon chlorination, it is continuously exposed to carbon tetrachloride, hydrochloric acid, and wet chlorine at temperatures up to 85°C.

THE RESULT: Right at home with these expensive corrosion resistant materials, this low-cost Penton valve first placed in service September 29, 1955, has operated *without a single failure for over forty months.*

Now you can get valves, pipe and fittings, pumps and meters, flame-sprayed or whirl-sintered parts protected by Penton. Whether you make or use processing equipment, we'll be glad to send you "The ABC's of Penton for Corrosion Resistance", and the technical brochure on Penton's properties and uses. Just write:

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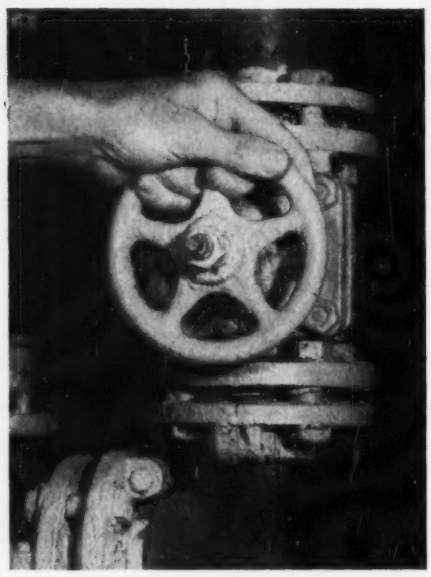

This Hills-McCanna diaphragm valve in service without failure since 1955 has a cast iron body and a Penton lining. Hills-McCanna also makes Penton-lined valves with aluminum bodies, and the same type valve with a solid Penton body.

CP59-3

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How Computers Save Time, Trouble, Money

Ever since computers moved into the field of engineering and scientific calculation, engineers have spent considerable time and ingenuity seeking new ways to solve increasingly complex problems by machine. Digital computers have taken over many of the engineer's time-consuming, routine calculating chores where accuracy is essential; analog computers provide a new way to keep tabs on the interrelated operations of complex systems in which many factors vary continuously. Here are three examples of how computers are saving trouble, time and money in engineering jobs:

1—"Dry run" testing of instrumentation.

Standard Oil of Indiana (Whiting, Ind.) uses an analog computer to determine how the full complement of control instruments on a given processing unit work together in combination and to test the system's compatibility with other equipment in the plant.

The computer is first hooked up to simulate all the operating conditions of the unit under investigation. Output signals representing typical temperatures, pressures, flow rates, etc., are fed to the control instruments, which in turn actuate equipment components such as valves. The valve positions are then translated into electrical signals from which the analog can compute flow rates, temperatures and pressures.

This computed performance data indicates over-all operating efficiency of the unit, reveals how well the control instruments are doing their jobs, relative to each other and to the other equipment.

THE PAYOFF: The analog simulation of process control systems serves primarily to minimize startup problems and process modifications after startup. The computed data is also a helpful guide for plant operators, assists design engineers in the selection of equipment and instruments that will work together within the required tolerances.

Final selection of control-system components is based on pilot-plant tests that determine accuracy of readings and speed of instrument response to changing conditions under actual operation. But the dry runs on the analog computer are credited with saving trouble, time and money in the design and startup stages of a new processing unit.

2—Estimating materials of construction.

The M. W. Kellogg Co. (New York) has put its computer to work on the complicated and exacting job of estimating material requirements for new construction. As a primary tool of the design engineering group assigned to study statistical estimating methods, the computer plays important roles both in the determination of the optimum estimating method and in actual estimation of materials.

The statisticians' first job in setting up an estimating procedure is to analyze and correlate actual material usages on a number of completed construction jobs. These initial studies involve the determination of a single dependent variable, such as cost, in terms of many independent variables. Object: to evaluate the relative effect of each item of material on over-all cost.

In the case of a simple correlation (one dependent and one independent variable), the job is not too cumbersome to be done by hand. But for multiple correlations involving a large number of independent variables, the computer is in a class by itself. In a recent study of instrumentation, for example, Kellogg had to analyze and correlate 10 factors that influence cost, based on data from 12 recently completed jobs. It's difficult to judge the savings in manpower at this stage of the work, but the company estimates that its statisticians can do about four times more than they could by manual calculation.

In the subsequent job of actually calculating material estimates according to the computer-derived equation, timesavings are quite apparent. A simple calculation that formerly took one man a full week can now be done in about 15 seconds on the computer. And multiple calculations that required a month of manual work are machine-computed in 15 minutes.

THE PAYOFF: What this means in terms of time saved is illustrated by the typical application of statistical estimating methods to an average piping estimate. By the manual technique, says Kellogg, it requires about 80-100 man-hours to figure the $300,000-500,000 worth of bulk equipment—pipe, fittings, flanges, valves, gaskets, supports, bolts, traps and welding rod—that goes into the piping of a $2-3-million unit. By the new computer method, the same job takes 15-20 man-hours, 45 minutes of computer time.

Of even greater significance, however, is the reliability of the machine-computed estimate. The statisticians' confidence in the result of the computer method, compared with manual calculation, can't be measured. But they're now getting consistency that wasn't obtainable by the older method. Accuracy of the information is limited only by short experience. But, to date, computer estimates haven't been off by more than 5%. And in one case, the machine missed by only $30 on a $235,000 estimate.

3—Speeding research data evaluation.

C. F. Braun & Co. (Alhambra, Calif.) uses an electronic digital computer to speed the analysis of engineering research data obtained from pilot-plant runs of test equipment. But the computer's greater accuracy and the reduction in time-consuming computations aren't the only criteria. In order to break even, says Braun, there must be a payout to justify the use of the machine.

A good example of an application that has resulted in substantial savings is a heat-transfer project now being studied by Braun's research department:

As key items of equipment in petroleum and chemical plants, heat exchangers have been studied continously since 1915. Basically, the problem is to compromise heat transfer with pressure drop so that the economies of high heat transfer won't be nullified by the cost of extra pumping equipment to overcome a high pressure drop. Though years of operating and research experience have narrowed the field in heat-exchanger design, says Braun, the correlations used as the basis for present ratings and designs are by no means precise. Therefore, continuous research is needed to approach the goal of precision.

The computer opened new horizons for heat-transfer research, says Braun. In the past, progress was impeded by the great length of time required for calculations after a test run. The elapsed time needed and the expense of manual computations limited the number of test runs, prolonged the testing program. Information drawn from one run took about eight hours to evaluate, had to be computed before the next test could be started.

With the help of the computer, it's now possible to complete the necessary calculations in just five minutes. Result: reduced time and expense permits many more test runs than were formerly possible; the research program is now continuous; increased number of runs provides more complete data, minimizes the need for interpolation and extrapolation.

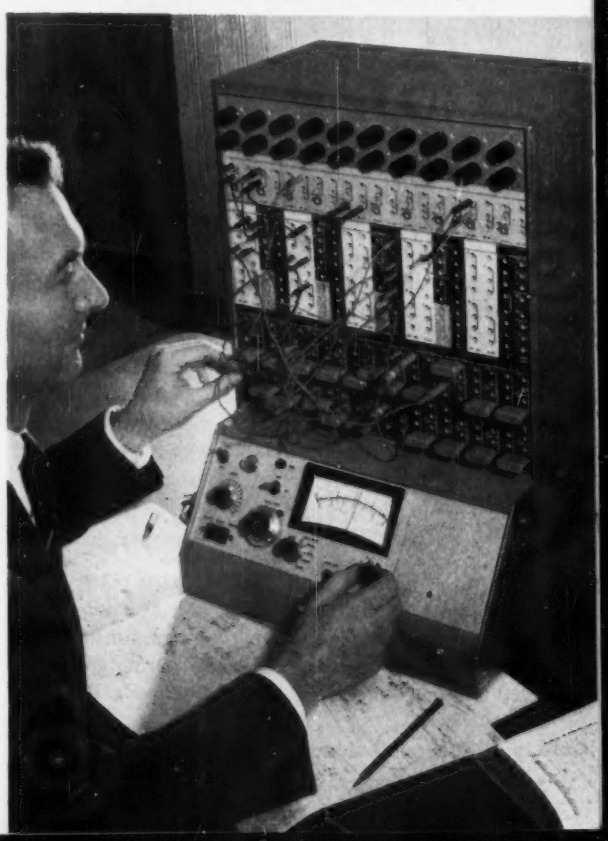
THE PAYOFF: Braun's present heat-transfer research project was set up last June; the first of some 1,000 test runs started in December. The breakeven point—where savings on tests compensated the cost of setting up the computer program—was passed last March with the completion of the 200th test run.

Estimated computer time required to handle the 6,000 operations involved in the calculation of each of the 1,000 tests is only 83 hours, compared with about 8,000 hours of an engineer's time to do the same job by hand. Evaluating one machine-hour as roughly equivalent to nine engineer-hours and adding 550 hours of a data-processing engineer's time, plus about 100 hours spent by the research engineer in preparing the computer program, Braun comes up with an over-all estimate of about $100,000 for the project. Cost of handling the entire project by manual calculation: about $180,000. Savings: about $80,000.

An interesting sidelight of the computer programing operation was the discovery by the computer of a number of errors in the manual calculations that showed up when the system was being "debugged." In effect, says Braun, the program was "dehumaned" as well as debugged.

As a result of the computer's speed and proved payout, Braun predicts, more projects can be performed —and in shorter time—with no change in the research department's over-all budget. What's more, the company adds, there are now greater possibilities for research programs that have been deferred in the past because of the laborious and costly calculations that went with them.

The first completely transistorized analog computer was unveiled last week by Electronic Associates, Inc. (Longbranch, N.J.). EA tailored the unit to solve problems that aren't large enough to justify the use of an analog computer, predicts it will be useful for small-scale problems in mass and heat balances and kinetics. Cost: $4-9,000.



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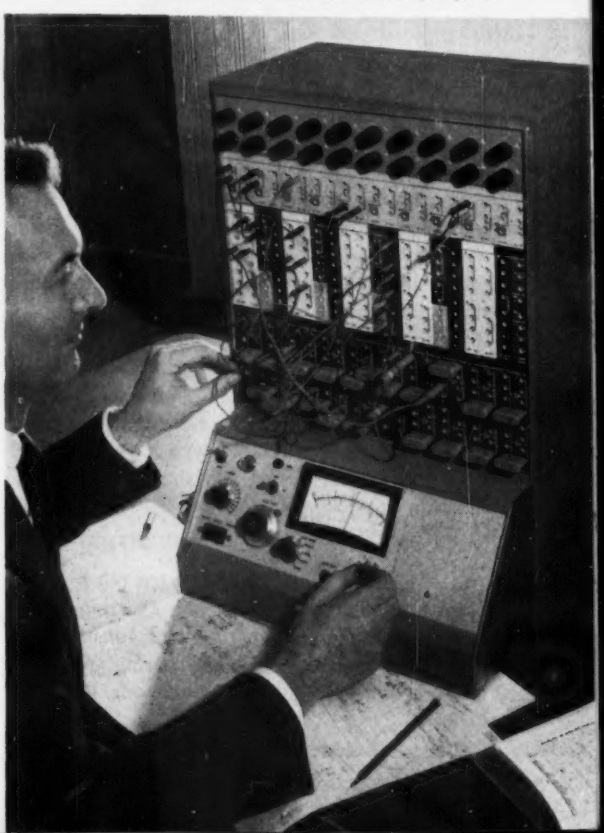

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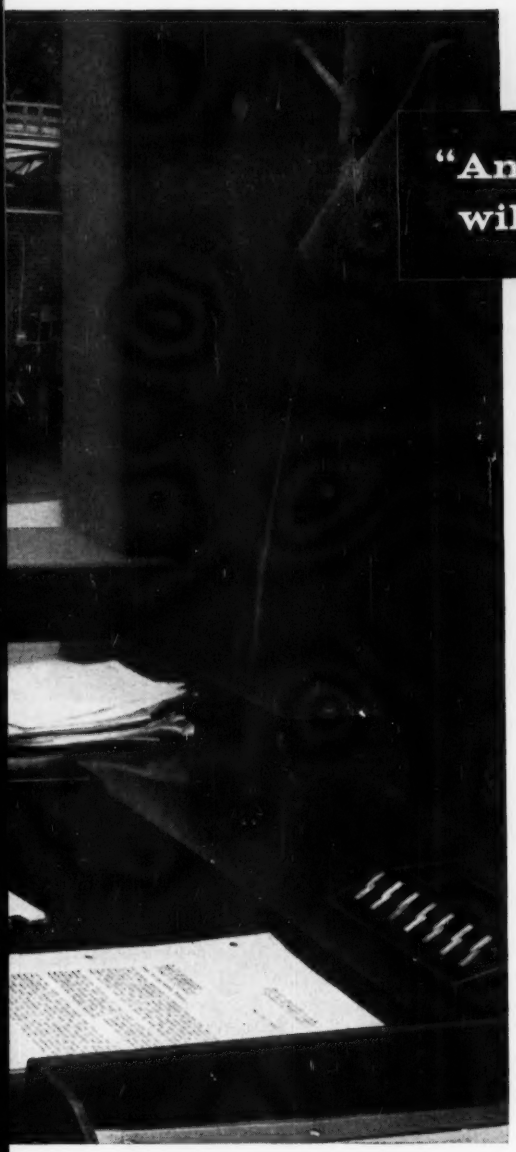

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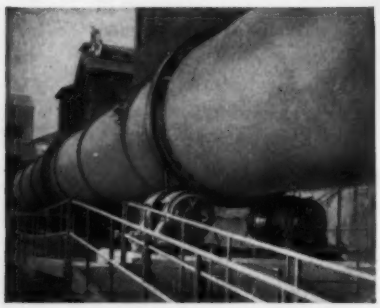

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Kermac's new uranium mill is cog in long-range expansion program.

Room to Grow for Uranium

Latest and largest addition to the nation's uranium ore processing facilities is Kermac Nuclear Fuels Corp.'s 3,630-tons/day concentrator mill at Grants, N.M. Situated in the heart of the most extensive uranium ore reserve in the U.S., the $18-million plant is a key part of Kermac's long-range program of permanent installation and expansion.

Looking beyond its present contract to supply $300-350 million worth of concentrate to the Atomic Energy Commission by the end of '66, Kermac takes an optimistic view of uranium's long-range future. Proved and probable uranium reserves in the Ambrosia Lake area—about half of which are Kermac-owned or controlled — are estimated at 40 million tons. In terms of energy content, that's equivalent to 10 billion bbls. of oil — roughly one-third of known U. S. petroleum reserves. Confidence in uranium's commercial future as a supplemental energy source was a key factor in Kerr-McGee Oil Industries, Inc.'s decision to join Pacific Uranium Mines Co. and Anderson Development Corp. in founding the Kermac venture.

Recovery Operations: Uranium extraction at the new Grants facility follows standard processing procedures. Sandstone ore from Kermac's two mines (three other mines are currently under development), plus some custom ore from independent operators, is received in 1,000-ton lots. After sampling and assaying to determine its value, the ore is ground in rod mills to produce a mud slurry (50% solids, 50% water) for chemical processing.

Ore slurry is leached with sulfuric acid in agitated tanks, with the addition of sodium chlorate to speed leaching and improve recovery. Leach liquor is separated from sand and slimes, clarified and then treated by a solvent extraction process perfected and first used on a commercial scale by Kerr-McGee Oil Industries' Shiprock, N.M., mill. Acid-stripping of the uranium-bearing solvent produces a concentrated uranium solution that's finally treated with ammonia and air to precipitate uranium as yellowcake.

One of the key supporting units of the new plant is a 400-tons/day sulfuric plant that produces all of Kermac's acid requirements, plus some excess for sale to other users. The acid plant is a prime example of

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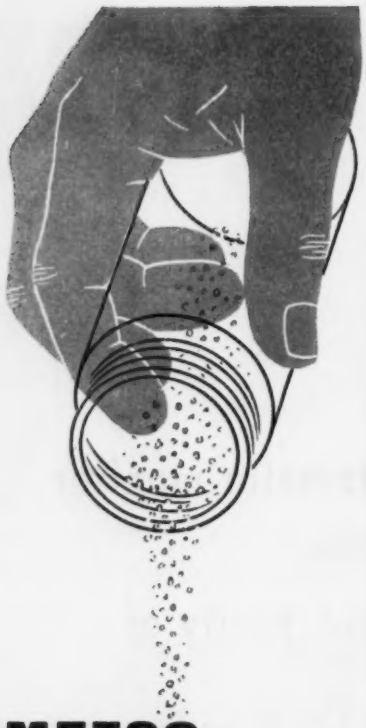

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automation in action, says Kermac; it requires only one operator and helper.

Soaring Production: With the addition of Kermac's new mill, uranium production in the Ambrosia Lake area is expected to reach a total value of $600 million by the end of '66. Others in the area: Phillips Petroleum Co. (1,989 tons/day); Homestake-Sapin Partners (1,650 tons/day); Homestake-New Mexico Partners (825 tons/day). Adding the 3,000-tons/day capacity of Anaconda's nearby Bluewater mill brings the total productive capacity of the Grants area to 10,275 tons/day — more than half U.S. uranium milling capacity.

Sugar in Automation

The startup last fortnight of a completely automated, $2.1-million melt house at Imperial Sugar Co.'s Sugar Land, Tex., refinery marked completion of Imperial's $7.5-million expansion program. It also brings a new note of modernization to the centuries-old sugar refining industry.

In essence, Imperial has teamed specialized equipment with electronic control devices. The firm, however, has accomplished this to a greater degree than most of its competitors in the sugar business. Result: affining of raw sugar — first step in the refining process — is a push-button-operation from start to finish. Here's how the interlocking system of equipment both monitors and regulates its own operation:

Raw sugar from storage is brought to the melt house by belt conveyer and bucket elevator, is fed to a fully automatic scale that weighs out 4,000-lb. batches. An electronic eye controls the dumping of each batch onto a second conveyor, which feeds the sugar to a "mingler" where it's mixed with an "affination" syrup to form a thick "magma." The syrup dissolves a brown film clinging to the raw sugar crystals.

The thick mixture is fed automatically to six centrifugals, which separate the sugar from the impurity-laden syrup. The centrifugals start and empty themselves, discharging washed sugar as needed to the next refining step. The washed sugar is then pumped to one of two melter tanks operating alternately on a 24-hour cycle. Here, a light-colored liquor of almost pure sugar is produced.

Nerve center of the melt house is the second-floor control room, where the progress of each batch is automatically traced by flashing lights on an electric panel board. The interlocking control system coordinates input data, regulates length of the centrifugal separation cycle according to the average level of washed-sugar liquor in storage. When the level is low, centrifugals operate close to the minimum set cycle; when the level is high, machines stop discharging washed sugar.

Imperial's new melt house replaces the last of the 117-year-old refinery's original buildings, completes the company's 12-year-old program for adapting modern control techniques to sugar processing.

Radiation Outlook

Chemical and petroleum processing applications rank high on the list of uses considered likely to develop into commercial markets for ionizing radiation. Arthur D. Little, Inc. (Cambridge, Mass.) recently reported a survey that revealed the following industrial consensus on key aspects of radiation's current and future prospects:

- Present commercial uses of radiation are concentrated on plastics applications, such as cross-linking of polyethylene, and sterilization use such as surgical sutures.
- Upcoming applications include 10 current developments described as "out of the research stage." One is a semipermeable electrodialysis membrane made by radiation-induced graft polymerization of styrene onto polyethylene; the other nine are still considered confidential, include petrochemical synthesis, portable energy sources, product sterilization and several plastics uses.
- Radiation research expenditures are about $10/year. ADL figures that active research projects number 20-60, of which one or two stand a statistical chance of developing into new processes within five years.
- High costs of radiation sources are a drawback. Present costs for 3-kw.-output rate range from $8/kwh. for electron accelerators to $9-11/kwh. for gamma-emitting radioisotopes such as cobalt-60 and cesium-137; for 30-kw. rate, they range from

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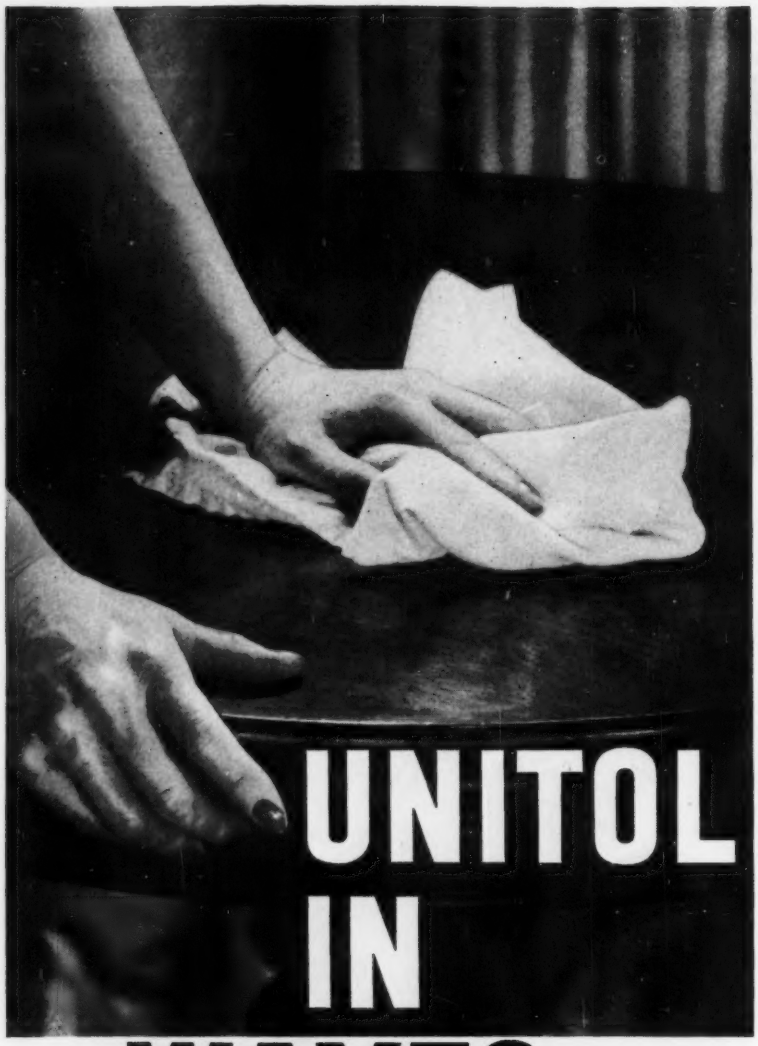

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$2-4/kwh. However, costs as low as 10¢/kwh. are "foreseeable" from multimegawatt sources.

• Stiff competition from conventional processing techniques is hampering radiation's progress in chemical jobs. Reasons: to date, radiation has initiated no reaction that can't be promoted by other means; effect of high-energy ionization is nonspecific. Despite these drawbacks, most companies hold out long-range hopes for new developments, feel it's too early to give up on radiation.

PROCESSES

Radiochemistry: Russian experiments aimed at producing chemical reactions directly by radiation were briefly mentioned at the recent Mendeleev Congress in Moscow by A. Alexandrow, a leading Soviet nuclear scientist. Present tests are believed to involve direct irradiation of air blown through the radioactive zone of a nuclear reactor to produce oxides of nitrogen at low cost. Other reactions being considered: production of ammonia, nitric acid and nitrogenous fertilizer.

•

Poly-Lactic Acid: A new catalytic process for polymerizing cyclic lactic acid has been patented in East Berlin. Special feature of the process is the low catalyst weight requirement — only 0.0001-0.01% of the weight of lactic acid. Suggested catalysts are bivalent oxides of Group IV metals — e.g., tin monoxide — that may be used in the form of a wall coating in the polymerization chamber. Polymerization takes place at 190-220 C, requires the use of an antioxidant amounting to 0.03-0.1% of the weight of lactic acid.

•

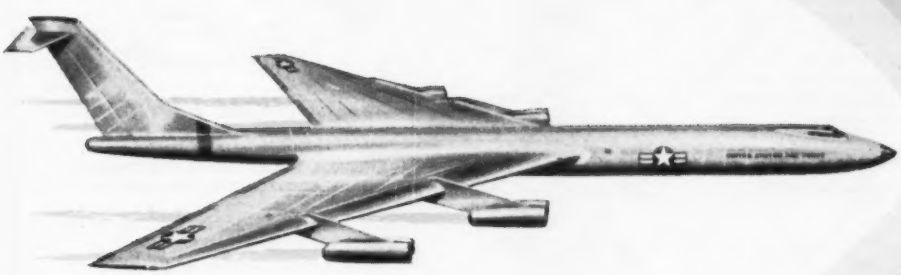
Titanium Sponge: Production of titanium sponge by the reaction of gaseous titanium tetrachloride with a reducing metal is described in a recent East German patent (DWP 14,838). New features: flow rate of gaseous titanium tetrachloride entering a vacuum chamber is controlled by regulating the temperature of the steam-heated gas container instead of by valves.

•

Gas Dewatering: Foaming detergents like those employed in household and industrial cleaners may help

Olin Mathieson

Fuel for tomorrow's planes



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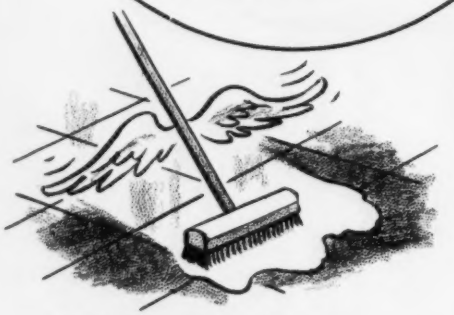

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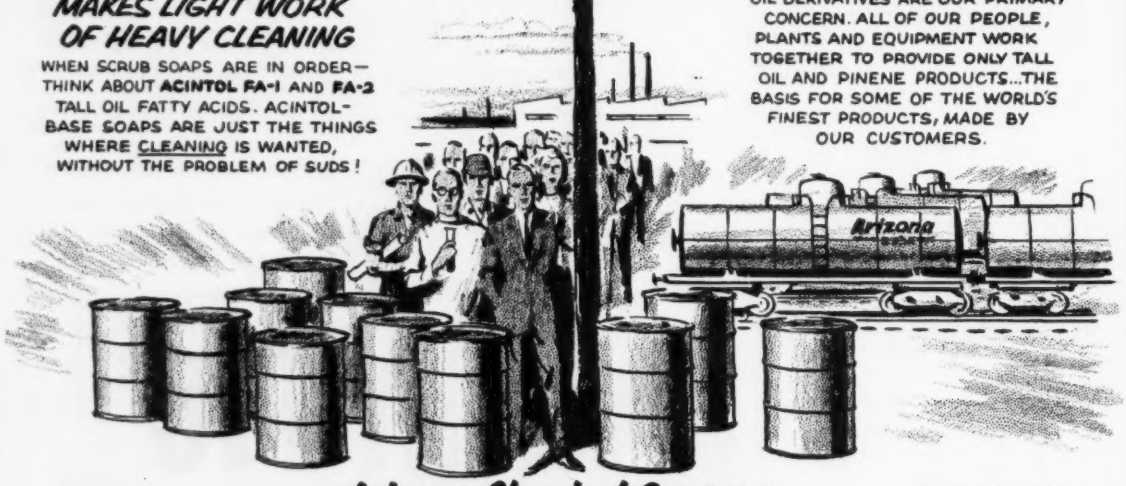

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natural gas producers conserve supplies and cut costs. The Bureau of Mines, in cooperation with American Gas Assn., has devised a low-cost foaming technique that uses the versatile syndets to extract water from "drowned" gas wells. Forced into the wells by a small portable pump, the detergents and water produce a foam that is forced up and out of the well bore — carrying the water with it. Successful tests in Texas, Kansas and Oklahoma indicate that cost of a single treatment varies from $3 to $10, depending on the amount of water to be removed. The bureau is continuing its research studies, hopes to adapt the present batch-foaming technique to continuous operation.

•

Foreign Licensing: Computers and vacuum-melting equipment figured in two recent foreign licensing pacts.

• Thompson- Ramo- Wooldridge Products Co. (Los Angeles) has licensed Intertechnique Co. (Boulogne-Billancourt, France) to manufacture and market RW-300 digital-control computers in France and French possessions. Intertechnique has a contract to supply a computing data-logging system for France's first commercial nuclear power plant, is also working with chemical processors, petroleum refiners and steel producers on applications in process control.

• F. J. Stokes Corp. (Philadelphia) granted its first foreign license to Heurty & Compagnie (Paris, France). Under this agreement, Societe Generale d'Applications Electro-Thermiques, a key company of the Heurty complex, will build and sell Stokes-designed vacuum-melting and heat-treating furnaces. First job: an induction-heated vacuum-melting and casting furnace for processing special alloys for Microfusion (Gennevilliers, Seine).

•

Tritium Offer: AEC last week released for civilian use 1 million curies of tritium, the radioactive isotope of hydrogen. Though limited supplies have restricted tritium to small-quantity uses (small amounts of the gas add pep and long life to luminous signs and electron tubes), AEC expects the availability of relatively large quantities will stimulate development of other industrial applications. Cost: $2/curie, plus packaging and handling charges.

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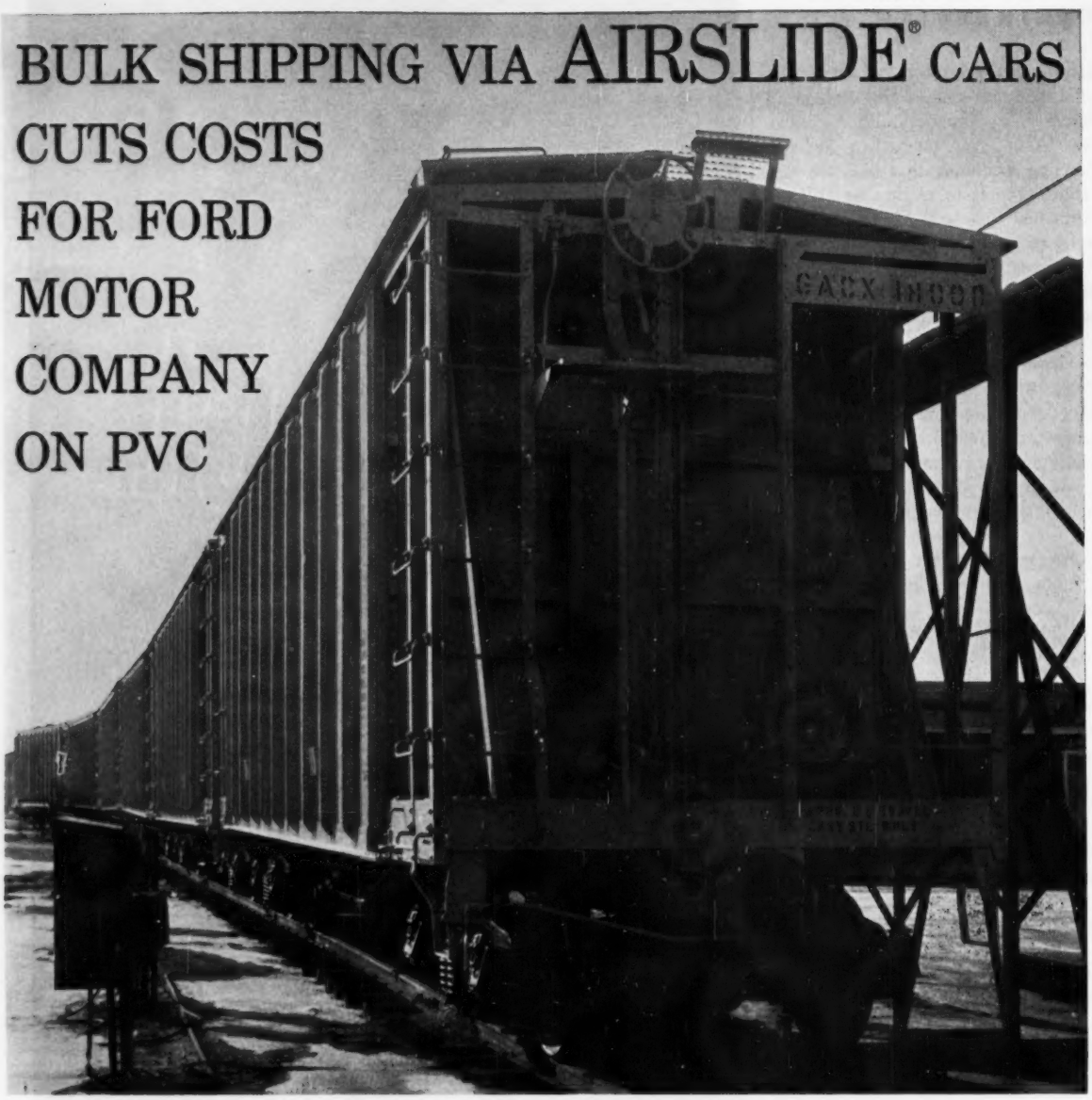

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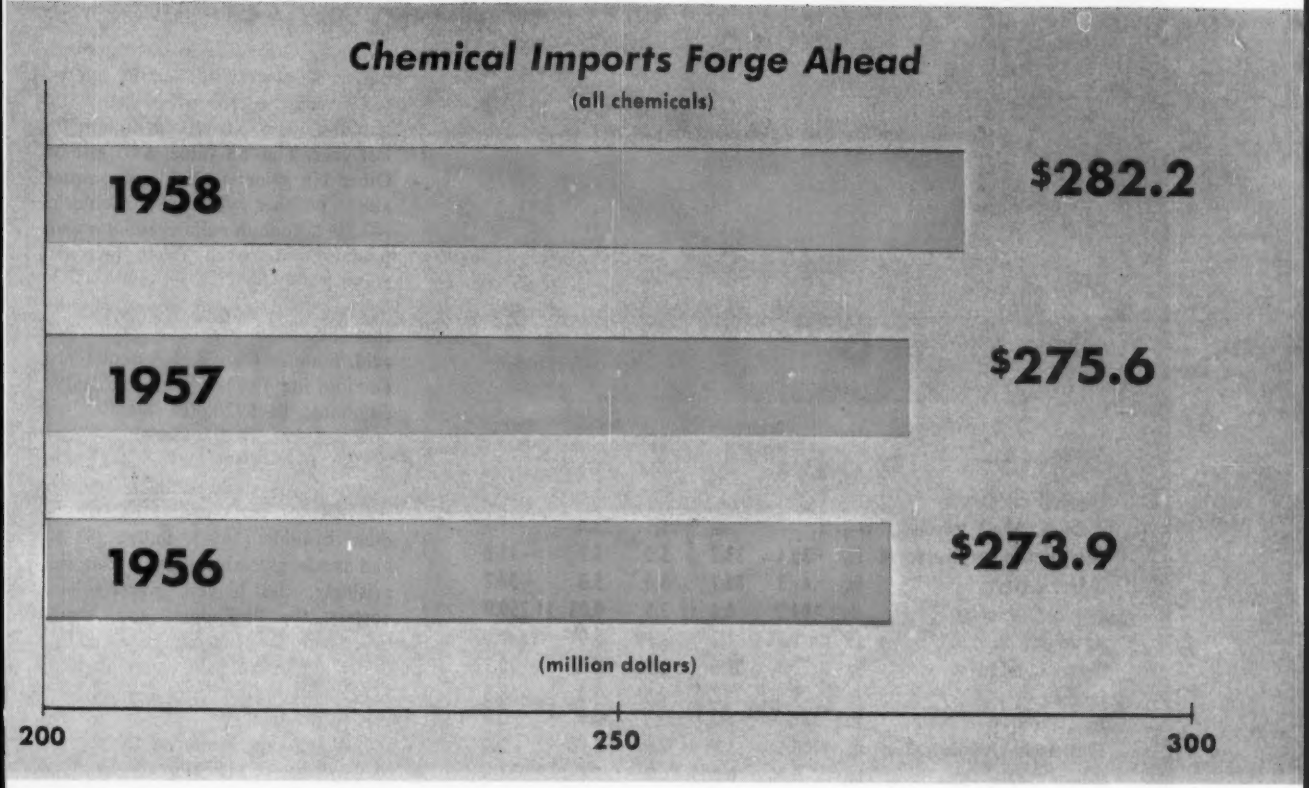


Gauging Growing Foreign Trade Threat

Chemical imports are rising again. After a lull in '57 that produced a gain of only 0.6% over '56, imports climbed last year to a value of $282.2 million, 2.4% better than the '57 showing, a big 11% boost over the '55 totals. Now, with the St. Lawrence Seaway opening inland markets, there's a strong likelihood that imports will climb still higher this year.

But the over-all figures tell only part of the story. More significant, perhaps, are import gains made by the two largest, most important commodity groups, fertilizer materials and industrial chemicals.

Fertilizer shipments, after declining in '57 and '56, rallied last year, managed to equal the '57 total value of $97 million. And industrial chemical imports increased 2.6%, to $87 million, about the same volume that cleared customs in '56.

Medicinal and pharmaceutical preparations continued their brisk rate of increase—30%. Total value: $15.1 million. Coal-tar chemicals also remained on the upswing, climbed 4.1%, to $60.3 million. In fact, of the seven broad classifications listed by the U.S. Dept. of Commerce, only two groups, the minor-volume pigments, paints and varnish and the soap and toiletry preparations registered declines.

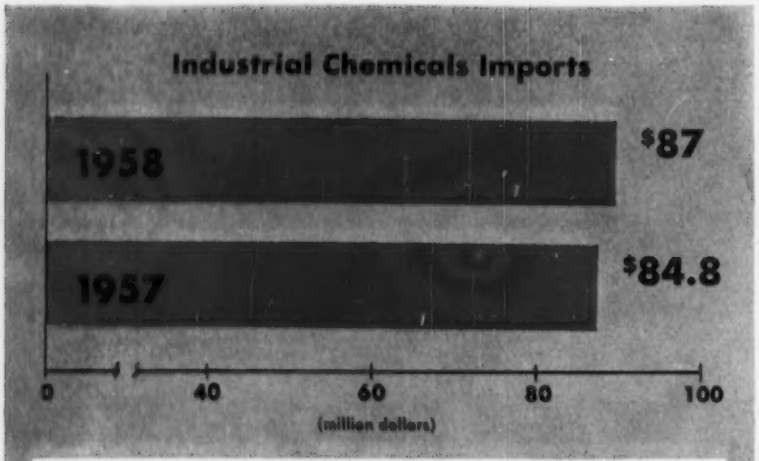
Sixty-two commodity groups in '58 showed import values in excess of $750,000. And of these, about 60% showed increased shipments. Of the 40 items that showed changes of 10% or greater, about 70% recorded import increases.

Seaway Impact: Except for a few important commodities, most chemical imports are sold relatively close to the ports of entry, largely on the East and Gulf Coasts. The now-open Seaway will provide overseas chemical marketers with direct access to important chemical-consuming centers at Buffalo, Cleveland, Detroit and Chicago.

Surprisingly, European vendors have not yet been too active in contacting U.S. distributors in those areas. But some of the merchant wholesalers and agents are taking the initiative, are sounding out foreign suppliers, *CW* found in a spot check. It is only a question of time before more foreign chemicals start reaching the Midwest.

Significant changes in the import pattern occur in almost every major commodity classification. Here are some of the highlights of the '58 changes:

Fertilizers: Reflecting the general pattern showing the arrest of the decline, the ammonium nitrate and mixtures group imports slipped off only 4% last year to a total value of $17 million. (The dip the previous year amounted to 22%.) An increase of 7%



	Unit	Quantity (millions) 1958	Quantity (millions) 1957	Value (million dollars) 1958	Value (million dollars) 1957	Percent Change
Chemical compounds not elsewhere specified	—	—	—	23.1	23.4	−1.3
Vinyl acetate, unpolymerized	lb.	30.4	33.2	5.0	5.7	−11.6
Sodium cyanide	lb.	41.3	82.7	3.6	5.5	−34.2
Alumina hydroxide	lb.	104.5	0.6	3.5	0.03	11,250.0
Ethers and esters	lb.	1.7	1.2	3.7	0.5	642.0
Glycerine, crude	lb.	22.4	33.6	3.3	4.7	−30.7
Furfural	lb.	28.4	29.5	2.9	3.2	8.8
Trichlorethylene	lb.	34.7	41.3	2.9	2.9	0.0
Vinyl alcohol and derivatives	lb.	15.5	13.4	2.61	2.56	2.0
Sodium sulfate, crude	l.t.	0.085	0.065	1.9	1.5	31.3
Sodium compounds	lb.	8.4	6.3	1.4	1.0	31.2
Blackings, powders, polishes	—	—	—	1.3	0.76	76.2
Iodine, crude	lb.	1.6	2.7	1.3	2.8	−52.1
Acetylene black	lb.	7.2	7.6	1.29	1.34	−4.2
Cobalt oxide	lb.	0.84	0.65	1.1	0.85	30.8
Dextrine (potato type)	lb.	11.9	11.3	0.97	0.91	6.7
Chlorine	lb.	28.4	20.0	0.97	0.69	40.5
Tartaric acid	lb.	2.9	1.6	0.92	0.46	100.0
Radioactive substitutes	—	—	—	0.91	0.82	10.2
Dextrine and substitutes	lb.	7.7	7.9	0.85	0.90	−5.6
Chloroacetic acid	lb.	5.6	4.2	0.82	0.68	20.0
Acetic anhydride	lb.	8.2	7.6	0.81	0.76	6.7
Acetic acid	lb.	8.3	7.2	0.77	0.60	28.0

in imports from Canada, to $12.8 million, partly offset sharp declines in imports from the Netherlands. In '58, Dutch sales to the U.S. were 27% below the $4.9 million worth sold here in '57.

Sodium nitrate imports in '58 amounted to about $13.4 million, off 22% (139,000 tons) from '57's. Ammonium phosphate imports also tumbled; at the $10.2-million mark, they were 11.1% below '57's.

But substantial increases in shipments of crude potassium chloride (20%), ammonium sulfate (17.4%), calcium nitrate (61.5%) and crude potassium sulfate (38%) helped maintain fertilizers' '57 import pace.

Industrial Chemicals: Whopping boosts in imports of the ethers and esters and the alumina hydroxide (for aluminum manufacture) groups more than offset declines in receipts of large-volume items such as crude glycerine, sodium cyanide and iodine.

Imports of ethers and esters increased more than sevenfold last year, reached $3.7 million in value. And, reflecting the surge in aluminum capacity, shipments of alumina hydroxide skyrocketed from less than 1 million lbs. in '57, to 104.5 million lbs. last year. The '58 value: $3.5 million. Other big gainers: blackings, powders and polishes (76.2%); chlorine (40.5%). Sodium sulfate, sodium compounds and cobalt oxide increased about 31%.

The '58 data also shows why the sole domestic producer of tartaric acid, Stauffer Chemical, has quit production: imports last year rose 100%, amounted to $920,000. Stauffer will now sell imported material.

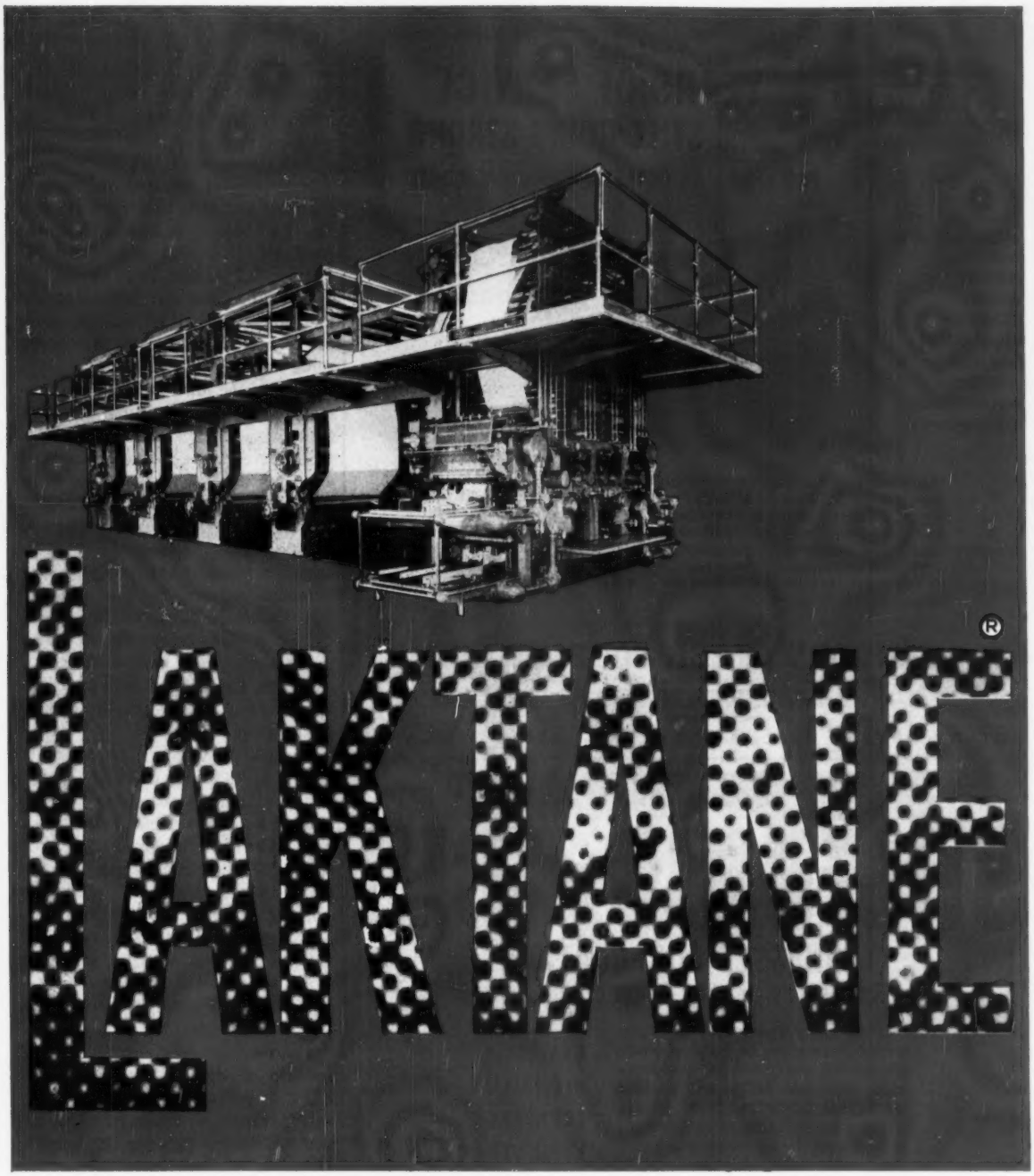
Only four of the larger commodity groups had significant decreases: unpolymerized vinyl acetate (12%); sodium cyanide (34%); iodine (52%); and crude glycerine (31%). Not surprisingly, the biggest glycerine exporters, the Philippines and Argentina, had the biggest losses. Their dollar volume drop amounted to $1.95 million for a total 13 million gal. of product.

Little change occurred in imports of vinyl alcohol, trichloroethylene and the miscellaneous product groupings.

Although imports of trichloroethylene remained at the $2.9-million mark, considerable shuffling took place in ranking of supplying nations in the import table. Italy remained the U.S.'s major foreign trichlor source, but its business here fell 11% (to $1.5 million). The United Kingdom increased U.S. sales (49%, to $635,000) as did Canada (up 38%, to $304,000).

Coal-Tar Chemicals: Despite substantial decreases in benzene imports (25%), naphthalene (27%) and the cresols and cresylic acid groupings (42%), the coal-tar product classification posted an over-all gain of 4.1%. Reason: largely because imports in other major divisions of this category registered surprisingly large gains.

Medicinal coal tars, for example, jumped some 27%, as about $10 million worth of the materials streamed through. Nonmedicinal acetanalides imports forged ahead 64%; total value, $6 million, was almost three times the value of acetanilides shipped in '56 ($2.2 million). Naphthol derivative imports also moved up markedly



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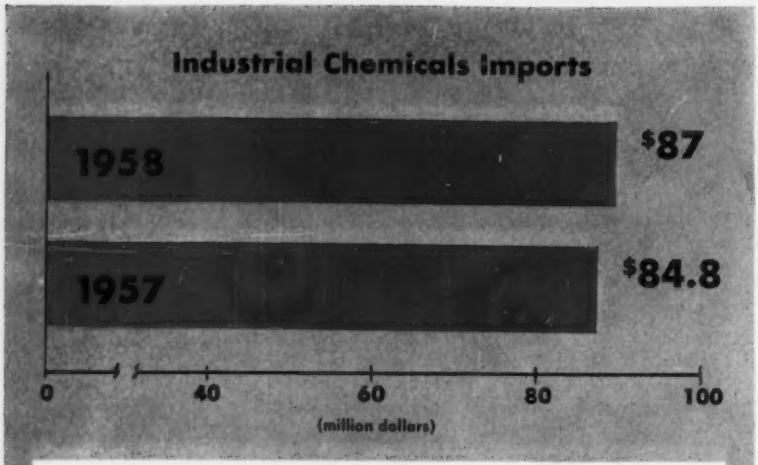

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Glycerine, crude	lb.	22.4	33.6	3.3	4.7	−30.7
Furfural	lb.	28.4	29.5	2.9	3.2	8.8
Trichlorethylene	lb.	34.7	41.3	2.9	2.9	0.0
Vinyl alcohol and derivatives	lb.	15.5	13.4	2.61	2.56	2.0
Sodium sulfate, crude	l.t.	0.085	0.065	1.9	1.5	31.3
Sodium compounds	lb.	8.4	6.3	1.4	1.0	31.2
Blackings, powders, polishes	—	—	—	1.3	0.76	76.2
Iodine, crude	lb.	1.6	2.7	1.3	2.8	−52.1
Acetylene black	lb.	7.2	7.6	1.29	1.34	−4.2
Cobalt oxide	lb.	0.84	0.65	1.1	0.85	30.8
Dextrine (potato type)	lb.	11.9	11.3	0.97	0.91	6.7
Chlorine	lb.	28.4	20.0	0.97	0.69	40.5
Tartaric acid	lb.	2.9	1.6	0.92	0.46	100.0
Radioactive substitutes	—	—	—	0.91	0.82	10.2
Dextrine and substitutes	lb.	7.7	7.9	0.85	0.90	−5.6
Chloroacetic acid	lb.	5.6	4.2	0.82	0.68	20.0
Acetic anhydride	lb.	8.2	7.6	0.81	0.76	6.7
Acetic acid	lb.	8.3	7.2	0.77	0.60	28.0

in imports from Canada, to $12.8 million, partly offset sharp declines in imports from the Netherlands. In '58, Dutch sales to the U.S. were 27% below the $4.9 million worth sold here in '57.

Sodium nitrate imports in '58 amounted to about $13.4 million, off 22% (139,000 tons) from '57's. Ammonium phosphate imports also tumbled; at the $10.2-million mark, they were 11.1% below '57's.

But substantial increases in shipments of crude potassium chloride (20%), ammonium sulfate (17.4%), calcium nitrate (61.5%) and crude potassium sulfate (38%) helped maintain fertilizers' '57 import pace.

Industrial Chemicals: Whopping boosts in imports of the ethers and esters and the alumina hydroxide (for aluminum manufacture) groups more than offset declines in receipts of large-volume items such as crude glycerine, sodium cyanide and iodine.

Imports of ethers and esters increased more than sevenfold last year, reached $3.7 million in value. And, reflecting the surge in aluminum capacity, shipments of alumina hydroxide skyrocketed from less than 1 million lbs. in '57, to 104.5 million lbs. last year. The '58 value: $3.5 million. Other big gainers: blackings, powders and polishes (76.2%); chlorine (40.5%). Sodium sulfate, sodium compounds and cobalt oxide increased about 31%.

The '58 data also shows why the sole domestic producer of tartaric acid, Stauffer Chemical, has quit production: imports last year rose 100%, amounted to $920,000. Stauffer will now sell imported material.

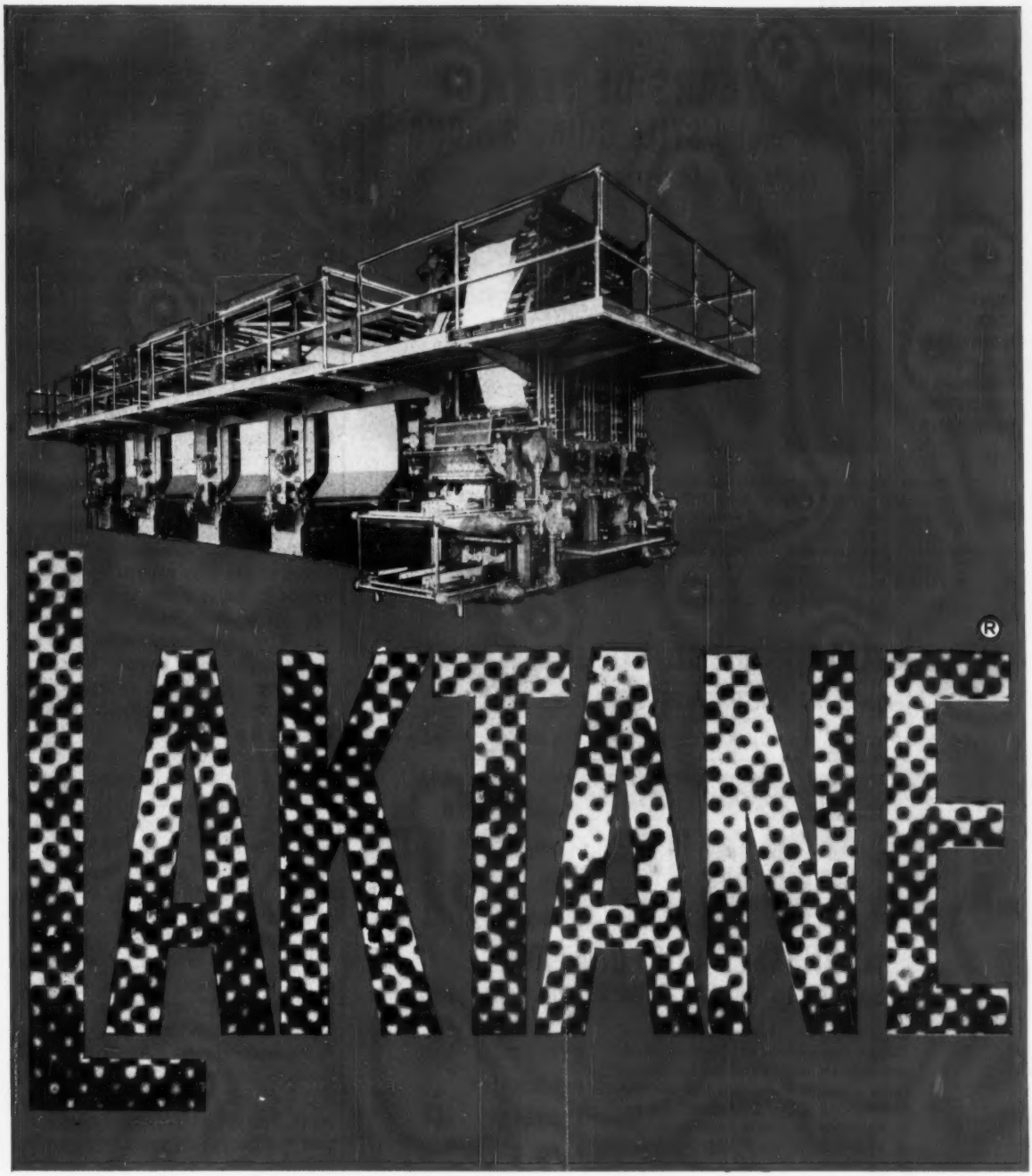
Only four of the larger commodity groups had significant decreases: unpolymerized vinyl acetate (12%); sodium cyanide (34%); iodine (52%); and crude glycerine (31%). Not surprisingly, the biggest glycerine exporters, the Philippines and Argentina, had the biggest losses. Their dollar volume drop amounted to $1.95 million for a total 13 million gal. of product.

Little change occurred in imports of vinyl alcohol, trichloroethylene and the miscellaneous product groupings.

Although imports of trichloroethylene remained at the $2.9-million mark, considerable shuffling took place in ranking of supplying nations in the import table. Italy remained the U.S.'s major foreign trichlor source, but its business here fell 11% (to $1.5 million). The United Kingdom increased U.S. sales (49%, to $635,000) as did Canada (up 38%, to $304,000).

Coal-Tar Chemicals: Despite substantial decreases in benzene imports (25%), naphthalene (27%) and the cresols and cresylic acid groupings (42%), the coal-tar product classification posted an over-all gain of 4.1%. Reason: largely because imports in other major divisions of this category registered surprisingly large gains.

Medicinal coal tars, for example, jumped some 27%, as about $10 million worth of the materials streamed through. Nonmedicinal acetanalides imports forged ahead 64%; total value, $6 million, was almost three times the value of acetanilides shipped in '56 ($2.2 million). Naphthol derivative imports also moved up markedly



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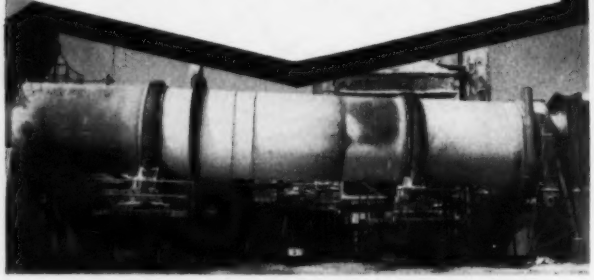

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SALES

—37%, to a total dollar value of $1.3 million. In '56, only some $560,000 worth of these products cleared U.S. ports.

The colors, dyes and stains group perhaps typifies the coal-tar products that had increases. Last year, 3.4 million lbs., valued at $8.8 million, entered the U.S. The comparable '57 figures: 2.7 million lbs., worth $7 million. The rise has been a steady one; in '56, only $6.3 million worth of coal-tar colorants in this group came into the U.S.

About one-fifth of the total increase was accounted for by Switzerland, which increased its exports to the U.S. 8%, to $4.7 million. West Germany boosted its sales here nearly a million dollars (to $3.1 million), an increase of 41%. And perhaps of significance is the huge (3,450%) increase in Japanese exports to the U.S. Although Japan's '58 total of $24,671 was small, its exports to the U.S. in '57 in this group were virtually nonexistent. The United Kingdom, exporting $454,345 of coal-tar colorants to the U.S. last year, also showed a whopping 257% hike.

Benzene imports in '58 decreased almost 11 million gal. and $3.6 million in value (to $10.9 million). Naphthalene imports also slid, were down 12.2 million lbs. (from 93.3 million lbs. in '57). Naphthalene import valuation dropped from $4.2 million in '57 to $3 million last year. Main reason: tremendous overcapacity in the U.S., a drop in demand stemming from the recession and, to some extent, increased demand for the materials in foreign markets.

Pharmaceuticals: Although total imports of drugs and medicinals—$15.1 million—is comparatively small, relative to industrial chemicals and fertilizers, the rate of increase (30%) in recent years may present domestic producers with a serious problem in 5-10 years. Imports of vitamins and vitasterols—already creating a problem for U.S. makers — is a case in point. The value of '58 imports ($1.6 million) was a staggering 171% over the '57 figure. Even more worrisome: the surge in a catch-all classification, nonalcoholic medicinals. It climbed 232%, to a total value of $3.3 million. Natural menthol (up 37.4%) and caffeine (up 41.1%) were also big gainers.

Downtrend: Two relatively small

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Chemical research at General Electric has created new silicone materials that are giving you better control over moisture and temperature . . . in "breathable" water repellents for clothing, leather and masonry . . . in lubricants and tough elastomers that work as well in space-cold missiles as they do in red-hot jets.

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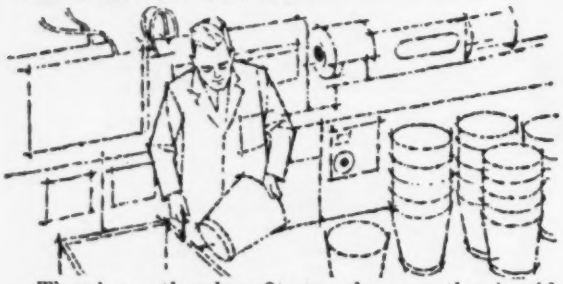
A look at today . . . and a glimpse

The Armids®

Armid is the Armour trade name for versatile amides derived from fatty acids. These high molecular weight chemicals are wax-like materials having chain lengths of 8 to 18 carbon atoms. All are non-toxic, non-deteriorating, neutral compounds. They can be used as mutual solvents for waxes and resins, viscosity modifiers, and melt-point improvers. They possess limited solubility characteristics in several volatile solvents.

Where the Armids work today

Polyethylene products: Armid O is sharply reducing the cost of shipping polyethylene waste baskets, tumblers and other molded plastic products. Costs are reduced because the Armid acts as a "slip agent" in the polyethylene, preventing the items from sticking together. This means fewer shipping containers, in most instances, because twice as many products can be "nested" in each container. In addition, the extra, costly production step of inserting paper or cardboard interliners between each plastic item is eliminated. As little as 0.05% of Armid O gives the "slip" property to polyethylene.



There's another benefit, too, because the Armid acts as an internal mold release agent for both injection and extrusion molding equipment. The Armid *migrates* to the polyethylene-mold interface and makes possible a quick, clean release when molding pressure is removed.

Armid O in polyethylene formulations means that fine lettering can be reproduced accurately on molded products. And there's no clogging of molds with tiny bits of polyethylene. Molding equipment cycles faster, operators spend less time cleaning the molds, and between-cycle release sprays are no longer required.

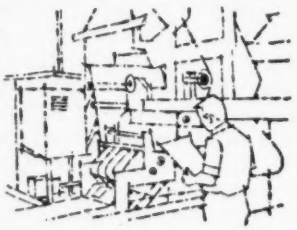
Armid O is used extensively in polyethylene films as an anti-block agent. Concentrations as low as 0.05% are extremely effective in producing film destined for use in garment bags and produce bags, where automation requires rapid machine handling. Armid O modified films will not "block" and are easily overprinted. There are no changes in film physicals.*

For more detailed information, check "A" in the coupon.

Wax papers: Improved penetration, flexibility, translucency, and better slip properties of the wax coating are several reasons why manufacturers of paraffin-coated wax papers are using Armid O.

This Armid—used as a modifier—acts as a mutual solvent for the primary paper-coating ingredients. As little as 0.1% of the Armid is required to produce a better bonded, more evenly coated wax paper.* *Check "B" in the coupon for more detailed information.*

Printing inks: Printing companies and newspapers have proved Armid HT to be one of the most effective anti-tack, anti-creep, anti-offset, non-scratch agents available for use in printing inks.



This Armid will not dull the ink's luster and prevents ink rub-off. It makes slip-sheeting unnecessary and actually helps shorten press runs. The Armid also improves ink adhesion when overprinting and/or wet-printing.

In addition, Armid HT "shortens" printing ink without thinning it. This permits controlled viscosity, increased consistency and improved appearance of ink on the printed paper.

More data is available from Armour. Check "C" in coupon.

Molded rubber products: Armid HT is used as an internal release agent in soft-rubber molded products.

The Armid also gives a high quality sheen and good appearance to sink mats, wash basins, car rugs, garden hose, footwear and other rubber products—and at a lower cost than the Carnauba Wax usually used.

For more data on this application, check "D" in coupon.

**The use of Armid O (oleamide) and Armid HT (stearamide) as a surface treatment for food packaging films is considered acceptable by F.D.A., and is discussed in the Quarterly Bulletin of the Association of Food and Drug Officials, Vol. 18 (1954) pages 129-134, and again in Vol. 20 (1956) pages 159-168.*

# of tomorrow

from Armour Chemical

Adhesive tape: Pressure-sensitive tape that unwinds easily without sticking to itself—even in hot, humid weather—is being achieved by incorporating Armid HT or Armid C as an anti-block agent in the back-coating. Due to the Armids' relatively high melting point, they will not "oil out" in warm weather, as do so many ordinary low-melting waxes.

Manufacturers report that a very small percentage of an Armid is needed to achieve this non-blocking, non-sticky effect.

Check "E" in the coupon for more information.

Other applications: Armowax, Armour's methylene bis-stearamide, is a high melting (132°C) amorphous wax. It is useful as a paraffin wax modifier, viscosity control agent in paint removers, internal mold release agent for soft rubber. Armowax emulsions find application in auto polishes, textile water repellents, and wire drawing operations.

Find out more by checking "F" in the coupon.

Chemical and physical properties

	Armid C	Armid HT	Armid 18	Armid O	Armowax
Iodine Value, Max.	10	5	2	80-90	—
Color-FAC Max.	11	15	11	5	35
Solidification Point (ASTM D-87-42)	85°C	98°C	99°C	68°C	132°C
Specific Gravity (Approx.)	0.890 (@25°C)	0.960	0.965	0.90	0.960

The Armids: Tomorrow

Extensive developmental work with the Armids is being conducted in Armour Chemical laboratories and also in the R & D labs of several large corporations.

For example, they are being tested as dye solubilizers for fluorescein dyes used in cosmetics. Because the Armids are non-toxic, they are valuable additives in lipsticks, rouge and pancake makeup.

Armowax has been successfully used to protect glassware during hydrofluoric acid etching operations. The glassware is dipped in molten Armowax and removed. The protective film is then scored in the areas where etching is desired. The remaining Armowax is removed by means of a hot solvent bath.

Test and evaluate the Armids. You probably have an important use for at least one of these products. Send the coupon or call Armour today.

NEWS NOTES

Washington. A patent, U.S. #2862880, was recently issued to Armour for a process of clarifying water containing colloidal suspension of negatively-charged mineral particles. This new process introduces into the water an N-alkyl trimethylene diamine, or a water soluble salt of the diamine.

•

Chicago. Several new gas chromotographic units are being used to analyze fatty acids and fatty derivatives at both the research and production laboratories of Armour. (*To be discussed fully in next "Ideas In Development"® periodical.*)

•

Milwaukee. It is now possible to make beer cartons that can be washed and re-used by incorporating an aliphatic amide into the lacquer used to coat the cartons.

•

Jacksonville. Effective anti-caking for pelletized and granulated fertilizer for only 0.25 to 0.5 cents per 80-lb. bag of fertilizer has been accomplished in a full-scale plant test. The test utilized a fatty amine formulation in the fertilizer.

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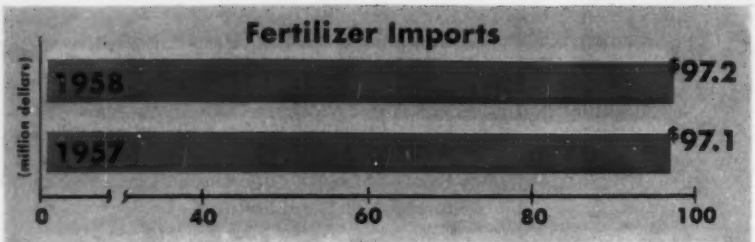
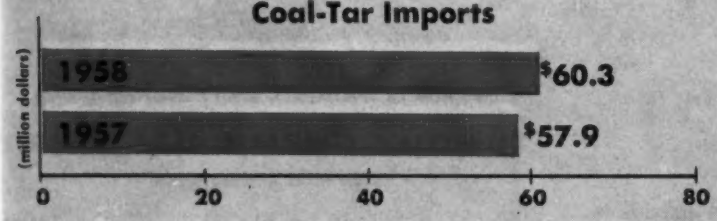


	Unit	Quantity (millions) 1958	Quantity (millions) 1957	Value (million dollars) 1958	Value (million dollars) 1957	Percent Change
Ammonium nitrate and mixtures	s.t.	0.335	0.353	16.98	17.7	—4.0
Sodium nitrate	s.t.	0.446	0.585	13.4	17.1	—21.5
Peat moss, fertilizer grade	s.t.	0.259	0.236	11.4	10.7	6.8
Ammonium phosphates	s.t.	0.159	0.169	10.2	11.5	—11.1
Potassium chloride, crude	s.t.	0.297	0.255	8.1	6.8	19.6
Ammonium sulfate	s.t.	0.187	0.165	6.9	5.9	17.4
Compounded fertilizers	s.t.	0.126	0.070	4.99	5.02	—0.7
Urea	s.t.	0.049	0.059	4.6	4.7	—2.7
Calcium cyanamide	s.t.	0.557	0.058	3.18	3.25	—2.0
Calcium nitrate	s.t.	0.088	0.060	3.0	1.9	61.5
Phosphates	s.t.	0.121	0.123	2.9	3.1	—4.7
Potassium sulfate, crude	s.t.	0.066	0.048	2.3	1.7	37.8
Prepared fertilizer mixtures	s.t.	0.030	0.028	1.8	1.7	7.2
Potassium-sodium nitrate mixtures, crude	s.t.	0.024	0.025	0.92	0.88	4.2
Dried blood	s.t.	0.0051	0.0053	0.90	0.94	—4.4
Fish scrap and meal	s.t.	0.0072	0.0034	0.84	0.35	140.0
Organic nitrogenous fertilizer material, not elsewhere specified	s.t.	0.016	0.0033	0.83	0.19	332.0



	Unit	Quantity (millions) 1958	Quantity (millions) 1957	Value (million dollars) 1958	Value (million dollars) 1957	Percent Change
Benzene	gal.	44.5	55.3	10.9	14.5	—24.7
Medicinal coal tars	lb.	2.3	1.4	10.0	7.9	26.5
Colors, dyes and stains	lb.	3.4	2.7	8.8	7.0	25.9
Dead or creosote oil	gal.	32.7	31.3	6.1	6.0	1.5
Acetanilides, not medicinal	lb.	4.6	3.0	6.0	3.7	64.2
Miscellaneous products	lb.	4.5	3.3	3.7	3.8	—1.3
Naphthalene	lb.	81.1	93.3	3.0	4.2	—26.7
Coal-tar acids	lb.	1.7	3.1	2.4	2.2	4.6
Synthetic phenolic resins	lb.	1.3	1.2	1.4	1.3	9.6
Naphthol derivatives	lb.	0.52	0.33	1.3	0.94	37.2
Cresols and cresylic acids	gal.	1.4	2.3	0.86	1.5	—41.6

broad-range classifications — soap and cosmetics, and paints, pigments and varnishes—bucked the generally rising trend. Imports of the former dropped about 6.6%, to $8.8 million in value, while protective coating materials fell 10%, to $11.2 million.

The decline in soap and cosmetic imports was general; perfumery and toilet water fell from $3.40 million to $3.36 million, while mixtures of odiferous substances declined 5.7%, to $2.3 million. Of the major groups, only enfleurage greases showed a spurt, up 23%, to $1.1 million.

The pattern in paints, pigments and varnishes was mixed. The group's largest dollar-volume item, barites ore, plummeted from $5.9 million and 740,000 lbs. in '57 to $3.7 million and 470,000 lbs. in '58. Litharge, another big item in that group, also slipped—down 15.8%, a decrease of $300,000 from the $1.8 million worth imported in '57.

The general decline in protective coating materials would have been much greater if zinc oxide shipments had not posted a huge increase. Some 24.2 million lbs. came through last year, more than double the 10.5 million lbs. imported in '58. Dollar value climbed 116.6%, reached $2.3 million.

Sumup: At the moment, U.S. chemical imports are relatively small, compared with U.S. exports of $1.4 billion and total chemical process industries sales of about $25 billion. Yet, imports have been moving ahead in recent years, will probably pass the $300-million mark in a few years. The Seaway may give new impetus to the trend. U.S. producers so far have felt the threat only on a few lines. But the number may well increase as foreign firms expand output, eye new ports developing in the Midwest.

Keeping Water Out

Third major multiwall bag producer to come out with a moisture-proof bag-sealer is Union Bag-Camp, Paper Corp. Following closely the entries by Hudson Pulp & Paper Corp. and Chase Bag Co., Union is now introducing both a special bag-sealer and multiwall bag. The latter is designed primarily for packaging hygroscopic products, such as fertilizers, caustic soda and nylon.

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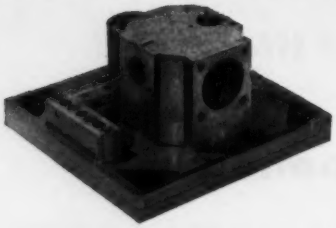

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SALES

offered in sizes designed to hold up to 100 lbs. of product and in two up to six plies of paper. The innermost ply, says the company, is coated with polyethylene or other heat-sealable coating. Usage will determine bag specification; Union envisions that a variety of plies will see service — kraft paper, kraft and foil, kraft, foil and polyethylene.

Union is making use of a novel design in bag fabrication. The outer plies are staggered, and as a result, the inner ply is exposed to facilitate direct heat-sealing. Until now, it has been impractical to heat-seal inner multiwall plies because the plies acted as an insulating barrier, prevented heat-sealing at normal conveyor-line rates. Before the outer plies are sealed, the inner ply is heat-sealed.

To close the special bag, Union is also launching a heat-sealing machine. The unit applies adhesive to the lips of the outer plies, which are then folded down and glued to the outermost ply. No pressure is placed on the heat-seal in this operation. At the same time, the machine applies a 2½-in.-wide gummed tape over the lip.

Union's current version operates at six filled bags/min. Faster models are now in development.

DATA DIGEST

- **Iron compounds:** 2-page bulletin gives characteristics and specifications of dicyclopentadienyliron and Ferrocene. Matheson Coleman & Bell, Inc. (Norwood 12, O.).
- **Synthetic fiber:** New bulletin discusses properties and applications of Vinylon, a fiber based on polyvinyl alcohol. Physical properties and fabric characteristics as well as facts on wet and mill processing and dyeing are included. Air Reduction Chemical Co. (New York).
- **Industrial deodorants:** New brochure gives technical recommendations for line of aerosol fragrances and industrial deodorants. Alpine Aromatics, Inc. (Metuchen, N. J.).
- **Packaging:** Illustrated booklet shows fundamental corrugated box designs and gives data on how to use corrugated materials in packaging. Hinde & Dauch (Sandusky, O.).
- **Muriatic acid:** Comprehensive, 40-page brochure describes major uses, mixing, dilution, storage, handling and

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safety considerations. Extensive graphs and tables give data on physical and chemical properties, analytical methods and mixing and dilution factors. Stauffer Chemical Co. (New York).

• **Tolylene diisocyanate:** Data sheet furnishes information on safe handling methods, waste disposal, storage and handling, medical aspects and first aid. Manufacturing Chemists' Assn. (Washington, D. C.).

• **Borohydrides:** Annotated bibliography discusses role of borohydrides in cellulose and sugar chemistry. Emphasis is given to research employing borohydrides as reducing agents for aldehydes and ketones. Reference is made to 18 publications on cellulose chemistry and 15 on sugar chemistry. Metal Hydrides Inc. (Beverly, Mass.).

• **Esters:** Properties and applications of 26 esters are subject of new, 48-page brochure. Application data stresses role of esters as solvents in formulation of protective coatings. Basic reference data (evaporation rates, viscosities of resin solutions, etc.) is included. A special section discusses ethyl formate, ethyl silicate and tetra 2-ethylhexyl silicate. Union Carbide Chemicals Co. (New York).

• **Gold plating:** A 12-page brochure gives facts on gold plating and use of metal in industrial and decorative applications. A second publication describes a hydrogen purifying unit for obtaining ultra-high purities through a palladium diffusion process. Engelhard Industries, Inc. (113 Astor St., Newark 2, N.J.).

• **Plastic pipe:** Pipe and vessel covering made from Styrofoam is covered in new, 12-page reference manual. Text and sketches show how coverings can be applied to a wide range of equipment. Tables give data on insulation thickness and heat gain. Dow Chemical Co. (Midland, Mich.).

• **Synthetic rubbers:** 16-page brochure gives specifications on seven types of synthetic rubber, tips on how processors cut milling time, power costs, storage expense, and free equipment for other work. Goodrich-Gulf Chemicals, Inc. (3121 Euclid Ave., Cleveland 15).

• **Polystyrenes:** Illustrated brochure defines types of company polystyrene materials available, presents properties and discusses design, fabrication, and finishing considerations for end-products. Plastics Division, Koppers Co. (Pittsburgh).

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CHEMICAL WEEK • ADVERTISERS' INDEX

May 9, 1959

ALLIED CHEMICAL CORP., NATIONAL ANILINE DIV. 31
Agency—James J. McMahon, Inc.

AMERICAN AGRICULTURAL CHEMICAL CO. 102
Agency—Marsteller, Rickard, Gebhardt & Reed Inc.

AMERICAN AIR LIQUIDE, INC. 100
Agency—Stanfield, Johnson & Hill Ltd.

AMERICAN CYANAMID CO. ... 121, 3rd cover
Agency—Erwin Wasey, Ruthrauff & Ryan, Inc.

AMERICAN POTASH & CHEMICAL CORP. 141
Agency—The McCarty Co.

AMOCO CHEMICAL CORP. ..... 4th cover
Agency—D'Arcy Advertising Co.

ARIZONA CHEMICAL CO. 130
Agency—Erwin Wasey-Ruthrauff & Ryan, Inc.

ARMOUR & CO. 138-139
Agency—Foote, Cone & Belding, Inc.

BAKER CHEMICAL CO., J. T. 76-77
Agency—Wildrick & Miller, Inc.

BAKER PERKINS, INC. 33
Agency—Price, Tanner & Willox, Inc.

BALTIMORE & OHIO RAILROAD 57
Agency—Richard A. Foley Adv.

BINDER COOPERAGE CO. 62, 98
Agency—Charles D. Karlsruher

BLAW-KNOX CO. 78
Agency—Ketchum, MacLeod & Grove, Inc.

BLOCKSON CHEMICAL CO. 7
Agency—Wm. Balsam Adv.

BRYTON CHEMICAL CO. 115
Agency—Benton & Bowles, Inc.

CATALIN CORP. OF AMERICA 63
Agency—Walter J. Gallagher, Adv.

CATALYTIC CONSTRUCTION CO. 129
Agency—Doremus-Eshleman Co.

CELANESE CORP. OF AMERICA 71
Agency—Ellington & Co., Inc.

CHATTEM CHEMICALS 143
Agency—Lookout Advertising Agency

CHEMICAL CONSTRUCTION CORP. 23
Agency—Godwin Advertising Co.

CHEMICAL WEEK BUYERS-GUIDE 50

COMMERCIAL SOLVENTS CORP. 14
Agency—Fuller & Smith & Ross, Inc.

CONTINENTAL CAN CO. 94
Agency—Batten, Barton, Durstine & Osborn, Inc.

CORROSION REACTION CONSULTANTS, INC. 108
Agency—Aron Advertising Assoc., Inc.

DAY CO., THE J. H. 46
Agency—The Keelor & Stites Co.

DELHI TAYLOR OIL CORP. 75
Agency—Sam J. Gallay Adv.

DORR-OLIVER INC. 111
Agency—G. M. Basford Co.

DOW CHEMICAL CO., THE 8-9
Agency—MacManus, John & Adams, Inc.

DU PONT DE NEMOURS & CO., INC., E. I. FREON PRODUCTS DIV. 112
Agency—Batten, Barton, Durstine & Osborn, Inc.

DU PONT DE NEMOURS & CO., INC., E. I. GRASSELLI DIV. 101
Agency—Batten, Barton, Durstine & Osborn, Inc.

DU PONT DE NEMOURS & CO., INC., E. I. POLYCHEMICALS DEPT. 122-123
Agency—Batten, Barton, Durstine & Osborn, Inc.

EL DORADO DIV., FORMOST FOOD & CHEMICAL CORP. 61
Agency—Garfield Adv., Inc.

ELLIOTT CO. 6
Agency—Downing Industrial Adv., Inc.

EMERY INDUSTRIES, INC. 53
Agency—Farson, Huff & Northlich, Inc.

ESSO STANDARD OIL CO. 135
Agency—McCann-Erickson, Inc.

FLUOR CORP. 116-117
Agency—Hixson & Jorgensen, Inc.

FRUEHAUF TRAILER CO. 21
Agency—The Allman Co., Inc.

GENERAL AMERICAN TRANSPORTATION CORP., AIRSLIDE CARS DIV. 132
Agency—Edward H. Weiss & Co., Inc.

GENERAL ELECTRIC CO. 137
Agency—G. M. Basford Co.

GIRDLER CONSTRUCTION DIV. OF CHEMETRON CORP. 13
Agency—Kirkgasser-Drew Adv. Agency

GREAT LAKES CARBON CORP. 25
Agency—Davis-Parsons & Strohmeier Adv.

GULF OIL CORP. 2
Agency—Ketchum, MacLeod & Grove, Inc.

HARSHAW CHEMICAL CO. 34

HERCULES POWDER CO. 118
Agency—Fuller & Smith & Ross, Inc.

HEYDEN NEWPORT CHEMICAL CORP. .. 99
Agency—O. S. Tyson & Co.

HOOKER CHEMICAL CORP. 29
Agency—The Rumrill Co., Inc.

HUDSON PULP & PAPER CORP. 35
Agency—Wilbur & Ciangio, Inc.

INDUSTRIAL PROCESS ENGINEERS 10
Agency—Scheck Adv. Agency

JEFFERSON CHEMICAL CO. 39
Agency—Darwin H. Clark Co.

JEFFERSON LAKE SULPHUR CO. 142
Agency—Bauerlein Adv., Inc.

KENNEDY VAN SAUN MFG. & ENGINEERING CORP. 124
Agency—Robert S. Kampmann, Jr. Adv.

LILLY & CO., ELI 105
Agency—Gardner Advertising Co.

LUZERNE RUBBER CO. 142
Agency—Eldridge, Inc.

MARKEL & SONS, L. FRANK 56
Agency—George Moll Adv., Inc.

METAL HYDRIDES, INC. 32
Agency—Creamer-Trowbridge Co.

METASAP CHEMICAL CO. SUB. OF NOPCO CHEMICAL CO. 72
Agency—Gray & Rogers Adv.

MICHIGAN CHEMICAL CORP. 58
Agency—Wesley Aves & Associates

MINERALS & CHEMICALS CORP. OF AMERICA 4-5
Agency—Richardson, Thomas & Bushman, Inc.

NORTON CO. 127
Agency—James Thomas Chirurg Co.

OLIN MATHIESON CHEMICAL CORP. ... 74
Agency—Doyle, Kitchen & McCormick, Inc.

PENNSYLVANIA DEPT. OF COMMERCE . 70
Agency—Bachman, Kelly & Trautman, Inc.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP. 55
Agency—Downing Industrial Adv., Inc.

PENNSYLVANIA REFINING CO. 65
Agency—Downing Industrial Adv., Inc.

PFIZER & CO., CHARLES 26
Agency—MacManus, John & Adams, Inc.

PHILADELPHIA QUARTZ CO. 126
Agency—The Michener Co., Adv.

PITTSBURGH COKE & CHEMICAL CO. .. 27
Agency—W. S. Walker Adv., Inc.

PLASTICS & COAL CHEMICALS DIV. ALLIED CHEMICAL CORP. 17-20
Agency—McCann-Erickson, Inc.

PRIOR CHEMICAL CORP. 142
Agency—Robertson Martin Adv.

RUBBER CORP. OF AMERICA 109
Agency—Oresey & Straus, Inc.

ST. REGIS PAPER CO. 10-11
Agency—Cunningham & Walsh, Inc.

SAFETY INDUSTRIES, INC., ENTOLETER DIV. 131
Agency—Oliver-Beckman, Inc.

SHANCO PLASTICS & CHEMICALS, INC. 143
Agency—Gordon J. Weisbeck, Inc.

SHAWINIGAN RESINS CORP. 69
Agency—Wilson, Haight Welch & Grover, Inc.

SHELL CHEMICAL CORP. ..... 2nd cover
Agency—J. Walter Thompson Co.

STANDARD STEEL CORP. 136
Agency—The McCarty Co.

STAUFFER CHEMICAL CO. 97
Agency—John Mather Lupton Co.

STEPAN CHEMICAL CO. 36
Agency—Frank C. Nahser, Inc.

TENNESSEE CORP. 136
Agency—Crawford & Porter, Inc.

THIOKOL CHEMICAL CORP. 93
Agency—Brown & Butcher, Inc.

UNION BAG-CAMP PAPER CORP. 128
Agency—Smith, Hagel & Knudsen, Inc.

UNION CARBIDE CHEMICALS CO., DIV. OF UNION CARBIDE CORP. 66
Agency—J. M. Mathes, Inc.

U. S. STEEL CORP., CHEMICAL DIV. ... 49
Agency—Batten, Barton, Durstine & Osborn, Inc.

U. S. STEEL CORP., U. S. STEEL PRODUCTS DIV. 1
Agency—Batten, Barton, Durstine & Osborn, Inc.

U. S. TESTING CO. 64
Agency—W. L. Towne Co., Inc.

VANDERBILT CO., R. T. 74
Agency—Pearsall & Schael, Inc.

VIRGINIA-CAROLINA CHEMICAL CORP. . 12
Agency—Albert Sidney Noble Adv.

VIRGINIA ELECTRIC & POWDER CO. ... 24
Agency—Cargill & Wilson, Inc.

VOGT MACHINE CO., HENRY 73
Agency—Farson, Huff & Northlich, Adv.

WESTVACO CHLOR-ALKALI DIV. OF FOOD MACHINERY & CHEMICAL CORP. 125
Agency—James J. McMahon Adv.

WEST VIRGINIA PULP & PAPER CO. ... 30
Agency—Fuller & Smith & Ross, Inc.

WORKLON, INC. 54
Agency—Arpadi-Sarett Assoc.

WYANDOTTE CHEMICAL CORP. 22
Agency—Brooke, Smith, French & Dorrance, Inc.

tracers SECTION

(Classified Advertising)

F. J. Eberle, Business Mgr.

CHEMICALS WANTED 145

CONTACT WORK WANTED 145

EMPLOYMENT 145

EQUIPMENT: Used/Surplus New For Sale 145

SELLING OPPORTUNITIES: Offered/Wanted 145

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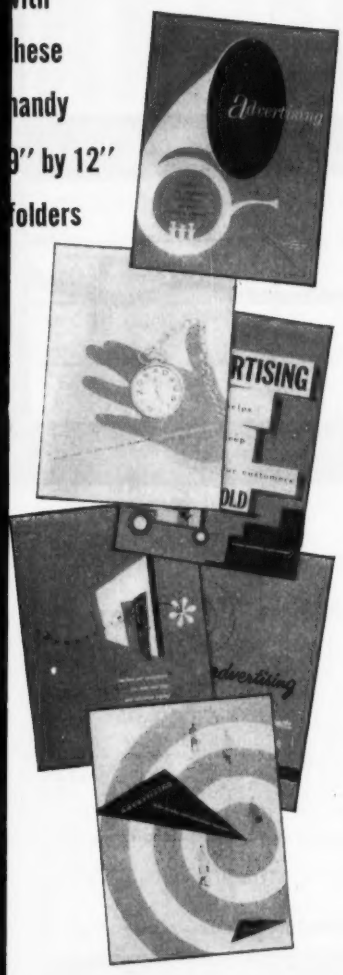

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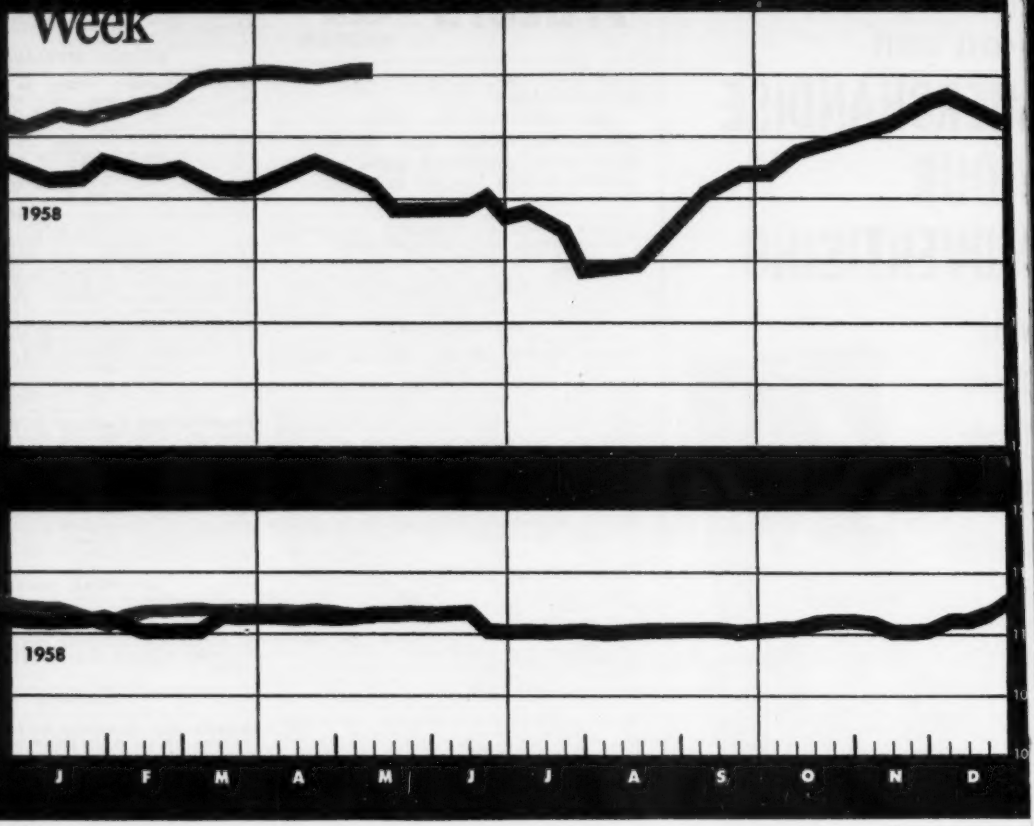
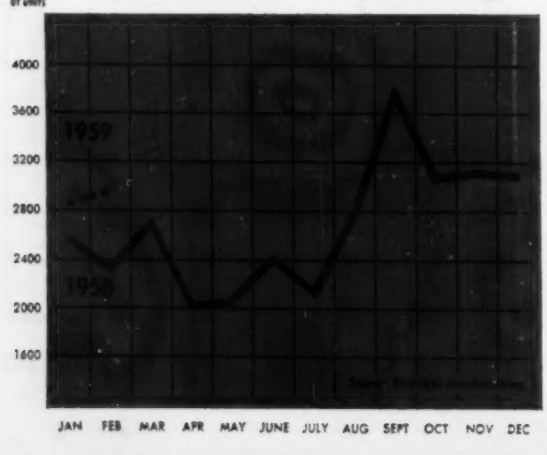


MAY 9, 1959

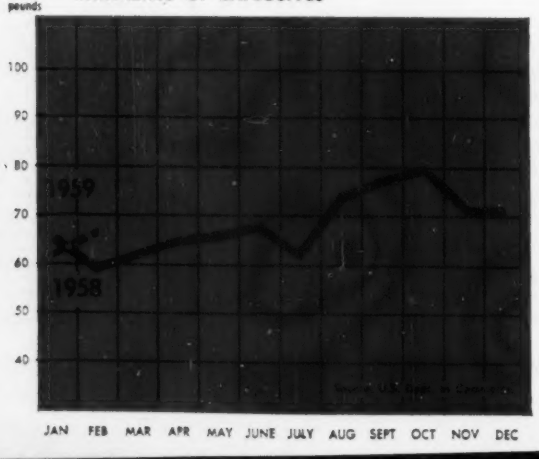
WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-1949=100)	202.0	201.4	179.0
Chemical Week wholesale price index (1947=100)	112.4	112.4	111.0
Stock price index (11 firms, Standard & Poor's)	56.02	55.49	39.14
Steel ingot output (thousand tons)	2,674	2,646	1,289
Electric power (million kilowatt-hours)	12,538	12,609	11,206
Crude oil and condensate (daily av., thousand bbls.)	7,132	7,133	6,212

MONTHLY INDICATORS—Production (1947-49=100)	Latest Month	Preceding Month	Year Ago
All manufacturing	149	147	129
Nondurable goods manufacturing	142	140	125
Durable goods manufacturing	156	159	138
Chemicals and allied products	202	201	179
Industrial chemicals	222	221	188
Petroleum and coal products	147	145	125

FACTORY SHIPMENTS OF MAJOR APPLIANCES



SHIPMENTS OF EXPLOSIVES



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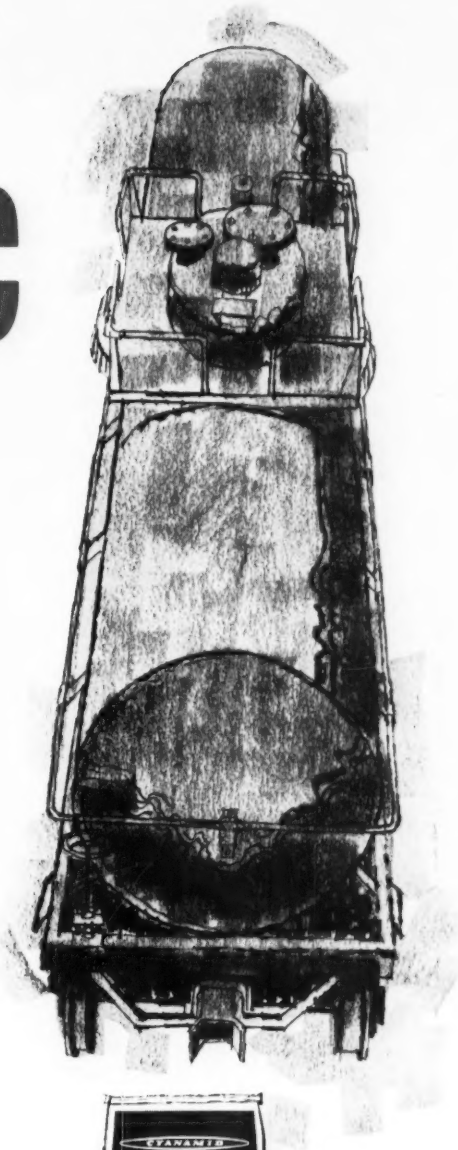

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Every shipment of Amoco Decyl Alcohol is checked for esterification color, acid color and high temperature color stability.

Because of this uniformity, high quality and purity, users save on time and processing ordinarily required to clean up the crude ester to meet specifications. They have less difficulty with the re-use of unreacted alcohol. Using Amoco Decyl Alcohol, high quality esters can be made without distillation. And because of its uniformity, purity, and high quality, Amoco Decyl Alcohol is the preferred material for DDP used in vinyl electrical applications.

Get the facts about Amoco Decyl Alcohol. Your Amoco Chemicals salesman has them. Call him. Your inquiry will receive immediate attention.

AMOCO CHEMICALS

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